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MAY 1949 • VOLUME 38 • NUMBER 5

DEFICIENCIES OF TINFOIL SUBSTITUTES IN THE PROCESSING OF ACRYLIC RESIN

George W. Ferguson,* D.D.S.; George C. Paffenbarger,† D.D.S., and Irl C. Schoonover,‡ Ph.D., Washington, D. C.

THIS investigation of substitutes for tinfoil used in the processing of denture base resins is a cooperative one carried out in the laboratories of and under the direction of the National Bureau of Standards, by personnel of the Bureau's staff, the Navy Dental Corps and the Research Commission of the American Dental Association.

No attempt has been made to formulate a specification for these tinfoil substitutes. Instead, the trade brand names are given in this report so that the dentist and the dental laboratory technician may have the data on the substitutes investigated, none of which prevents blanching or surface strain. In fact the use of any of the tinfoil substitutes tested may be a contributing cause of the ultimate failure of the denture.—*Executive Board, Research Commission, American Dental Association.*

Tinfoil has always been the classic material for lining plaster of paris (gypsum) molds used in the processing of nonmetallic denture bases. The difficulty of applying tinfoil has continually stimulated the search for a satisfactory substitute. This search, intensified during World War II when the importation of tin was cut off, resulted in the development of an alginate material by one of the authors (I.C.S.) and George R. Dickson at the National Bureau of Standards.[1-3] This substitute served as a stopgap and is the basis of many of the current substitutes.

Publication approved by the executive board of the Research Commission (now the Council on Dental Research). This work was materially assisted by grants-in-aid made to the Research Commission by the American Denture Society and the Academy of Denture Prosthetics.

The opinions or assertions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

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Table 1.—Tinfoil substitutes

Material	Manufacturer or distributor
Experimental film-forming solutions	
Alginate compound*	H. D. Justi & Son, Inc.
Nylon (type 6)	E. I. du Pont de Nemours & Co., Inc.
Stopcock grease—a silicone lubricant	Dow Corning Corp.
Substitute for tinfoil (alginate)†	Experimental material developed at the National Bureau of Standards
Commercial film-forming solutions	
Acra-Foil	Acra Tone Co.
Acryfoil	Rockland Dental Co., Inc.
Al-cote	The L. D. Caulk Co.
Algex	Vernon-Benshoff Co.
Colorgard	The Ransom & Randolph Co.
Film-Ac	H. D. Justi & Son, Inc.
Glossy-Glaz	Kerr Dental Mfg. Co.
Hydrolac	Whip-Mix Corp., Inc.
Liquickfoil	The Motloid Co., Inc.
Miracle Foil	Dental Perfection Co.
Nofoil	Iteco Dental Mfg. Co.
Plaster-Cote	Vita-Lite Products Co.
Sans-Foil	Union Broach Co., Inc.
S. S. White Separating Film	The S. S. White Dental Mfg. Co.
Vita-Glaze	Vita-Lite Products Co.
Preformed film	
Hygienic Dental Dam (Special Thin)	The Hygienic Dental Rubber Co.
Dental Dam	Ohio Latex, Inc.
Dam, Rubber	U. S. Rubber Co.

*Stock No. 5502500 Powder, Protective for Acrylic Material. (In accordance with Army Purchase Description No. 9, dated January 4, 1945 for item No. 5502500.)

†Report of Research Commission, Substitute for Tinfoil. *J.A.D.A.* 29:1349 (July 15) 1942.

At the time of the development of the alginate-containing substitutes, experiments on other materials were being conducted at the National Bureau of Standards. Among the most favorable materials under investigation was "Nylon" type 6, a development of E. I. du Pont de Nemours & Company. (No announcement was made at that time because of its extreme scarcity.) Recently a thin sheet of taut rubber dam has been offered as a substitute for tinfoil over the tissue-bearing surface of the denture.[4]

Some of the advantages and disadvantages in the use of certain substitutes are: Sodium silicate produces a smooth polished surface on the plaster mold and it usually (but not always) prevents the resin from adhering to the plaster, but it does not prevent blanching and fogging of the resin. Soap solutions produce a smooth surface; however, fogging of the resin, blanching and occasional adherence of the resin to the mold are encountered. Alginate is not as satisfactory as tinfoil; some blanching of the resin occurs. "Nylon" type 6, supplied in a methyl alcohol-chloroform solution, forms, when sprayed or painted on a plaster cast or model, a film superior to an alginate film in protecting the acrylic resins from blanching and in preventing adherence to plaster. The "Nylon" sometimes adheres to the resin. Rubber dam occasionally adheres to the resin. It permits fogging of the resin, and some dams discolor the resin.

Regardless of their shortcomings, these substitutes are supplanting tinfoil to a great extent because of their ease of application. So far no thorough investiga-

1. Report of Research Commission, Substitute for Tinfoil. *J.A.D.A.* 29:1349 (July 15) 1942.

2. Report of Research Commission, Additional Information on the Substitute for Tinfoil. *J.A.D.A.* 29:1762 (Sept. 15) 1942.

3. Schoonover, I. C., and Dickson, G. R., Process for Protecting Plastics During Curing or Molding. U. S. Patent No. 2,333,679, Nov. 9, 1943.

4. Jeffreys, F. E., and Harris, L. W., An Improved Separating Medium for Acrylic Resin. *U. S. Nav. M. Bull.* 47:171 (Jan.-Feb.) 1947.

tion of their efficiency or of their effect on the chemical and physical properties of the resin has been published. It is the primary purpose of this paper to present such information.

Materials Investigated

Fifteen tinfoil substitutes procured in the retail market and four experimental ones were investigated. These materials, together with the respective manufacturers, are listed in Table 1.

No chemical analyses were made of the commercial film-forming substitutes. The formulas of the experimental film-forming substitutes are given in Table 2.

Experimental Procedure

The directions which accompanied the products were followed implicitly in all instances in the preparation of test specimens. The test piece employed in the initial experiments was a flat specimen of the dimensions shown in Figure 1. Where possible, half of the surface of the specimen was protected with tinfoil and the other half with the tinfoil substitute. Thus the tinfoil-protected surface served as a control.

The resin employed in most of these tests was "Densene" (regular), clear. Other trade brands of resins were also used but no significant difference was noted among the various resins.

The following technic was used in curing the specimen blocks:

1. Thirty ml. of polymer (powder) was mixed with 10 ml. of monomer (liquid) for 30 seconds in a glass jar.

2. The glass jar was covered and placed in water at approximately 55 C. (131 F.) for 10 minutes.

3. The flask was trial packed using moistened cellophane as the separating medium unless the directions of the manufacturer of the tinfoil substitute specified otherwise.

4. The flask, held in a spring clamp, was placed in water at room tempera-

Table 2.—Experimental film-forming solutions

Material	Essential ingredient	Formula
Alginate compound	Sodium alginate	Sodium alginate 87.7% Sodium benzoate 8.8% Duodecahydrate trisodium phosphate 3.5% One ounce of the formula is used in 3 quarts of water.
"Nylon"	Soluble "Nylon" (type 6)	Nylon 10 to 15 Gm. Methyl alcohol (absolute) 100 ml. Chloroform 50 ml.
Stopcock grease	Silicone lubricant	
Substitute for tinfoil (alginate)	Ammonium alginate	Ammonium alginate 15 Gm. Trisodium phosphate 5 Gm. Water 100 ml. A hardening solution of 20 to 50 Gm. of calcium chloride in 100 ml. of water is used in conjunction with the above formula.

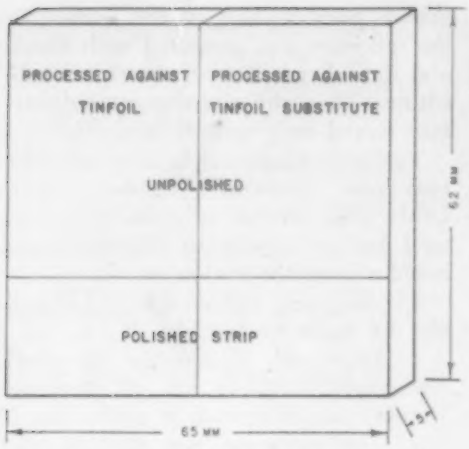


Fig. 1.—Shape of acrylic resin specimen employed in initial experiments. Later an upper denture form was used (Fig. 8)

ture. The temperature of the water was gradually raised to boiling in one hour, and boiling continued for 45 minutes.

This technic, which is in general that specified for the resin employed, produced sound specimens. Most of the specimens were processed by the compression technic. Additional specimens, both flat and in denture base form, were molded by the injection method.

Effect on Physical Properties

Most of the work on the effect of tinfoil substitutes on physical properties of the resin has been primarily concerned with the prevention of blanching and of adherence of the resin to the plaster.

Molnar and Moore[5] reported that the physical and chemical properties of resins were not appreciably affected by the use of tinfoil substitutes, and that the curing shrinkage of the resin was less when the substitutes were employed.

Blanching, Fogging and Discoloring.—The specimens processed by compression in artificial stone ("Hydrocal") molds with half of their surface protected by tinfoil and the other half by a tinfoil substitute were always blanched and fogged on the substitute-protected side, as shown in Figure 2. Other substitutes listed in Table 1 but not shown in Figure 2 gave similar results. Resins processed by an injection method were also fogged and blanched when cured against tinfoil substitutes.

The following experiment was performed to determine the relative depth of the fogging and to ascertain the comparative ease of polishing the surfaces protected by tinfoil and by tinfoil substitutes.

The top and bottom surfaces of the specimen block (Fig. 1) were protected by a sheet metal clamp except for a strip about 20 mm. wide. With a micrometer caliper the thickness of this exposed strip was determined at six places. The exposed surfaces were polished for three minutes (one and a half minutes on each side of the block) with a 5 inch rag wheel charged with pumice, and then for one and a half minutes (three fourths of a minute on each side of the block) with a 5 inch rag wheel charged with whiting. The thickness of the exposed area was again determined. Even though from 0.06 to 0.13 mm. (0.002 to 0.005 inch) of resin was removed during the polishing of the block, the fogginess persisted in the areas protected by the tinfoil substitutes (Fig. 2). Blanching of the pink resin was still apparent after removal of 0.1 mm. (0.004 inch) from each surface.

Some investigators[5] believe that the cloudiness or blanching of resin cured without benefit of tinfoil is caused by water in the form of an emulsion. Water does play an important role in causing blanching, but the exact mechanism is unknown. For instance, if a clear block of acrylic resin is heated in an autoclave

5. Molnar, E. J., and Moore, T. E., Tinfoil Substitutes for Processing Acrylic Dentures and Their Effect on the Finished Product. (Abstract) *J. D. Res.* 22: 203 (June) 1943.

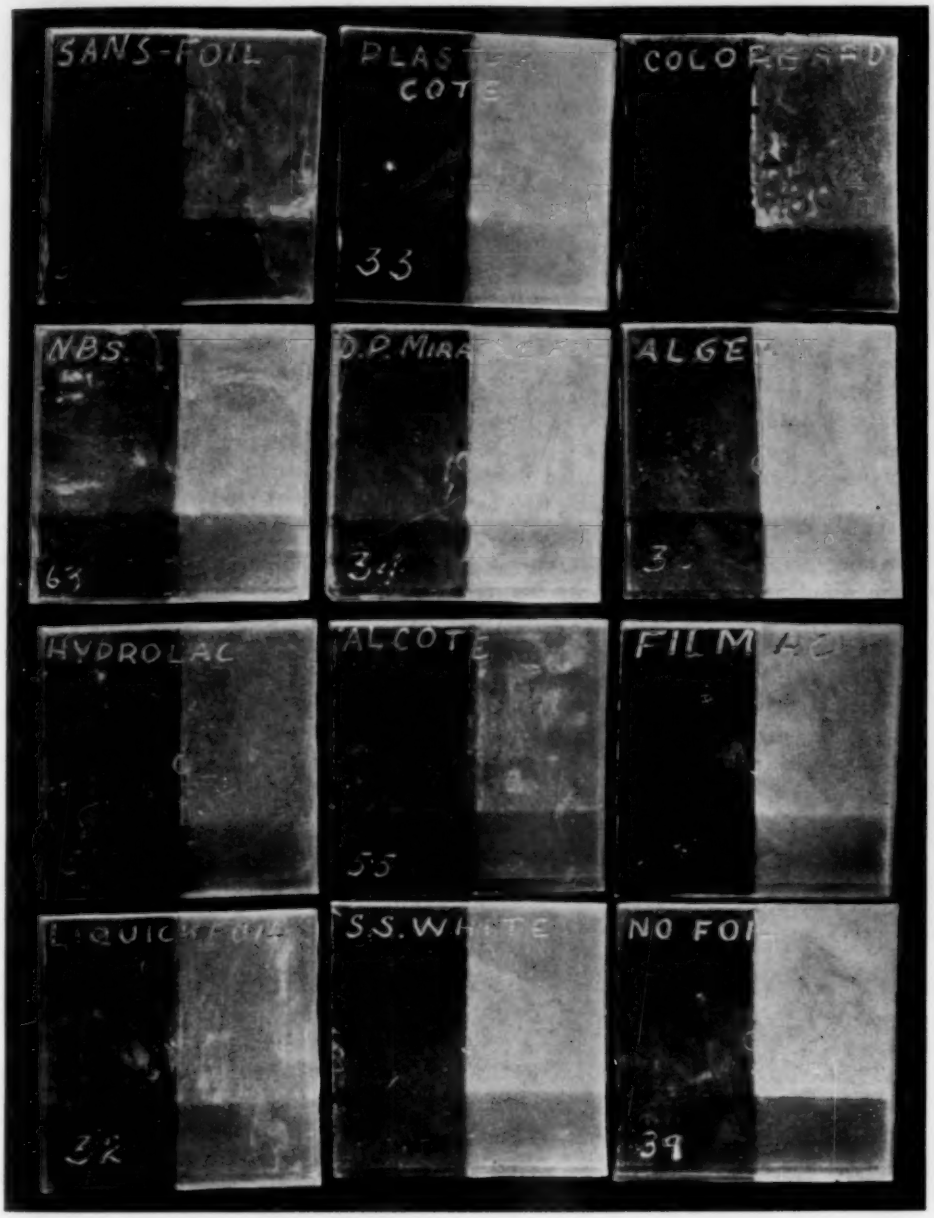


Fig. 2.—Flat specimens of clear acrylic resin (Fig. 1) photographed against dark background. During processing the left half of each specimen was protected with tinfoil and the right half was protected with one of the tinfoil substitutes. All the left halves are comparatively clear, as the dark background shows through. The right halves show varying degrees of opaqueness, evidenced by masking of the dark background. The opaqueness remained even when from 0.002 to 0.005 of an inch was removed by polishing from each side of the lower third of the specimens. Other substitutes listed in Table 1 but not shown in this illustration produced similar results

it soon becomes opaque. The opaqueness begins on the surface and gradually penetrates the whole specimen. If the blanched specimen is reheated in a dry atmosphere, the whiteness will disappear and the specimen will again become clear.

However, fogging is difficult to produce by adding water to the resin before or during curing. An experiment was performed in which the powder (polymer) was exposed to a water-saturated atmosphere for 10 days. It was then mixed with the liquid (monomer) which had been saturated with water (approximately 1 per cent of water in the monomer).[6] This water-saturated mixture was then cured. The flask prior to packing was saturated by submerging it in water under reduced pressure. The unlined mold was then filled with water, which of course was largely displaced during packing. The packed flask was then immersed in water at room temperature and gradually brought to boiling in two and a half hours, boiled for half an hour and slowly cooled to room temperature. Plaster adhered to part of the top surface but the specimen was not cloudy. Fogging does not occur when the resin is trial packed with wet cellophane and processed against tinfoil.

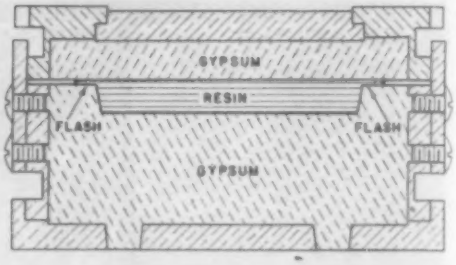


Fig. 4.—Position of specimen invested in gypsum in flask

In other experiments monomer was mixed with water saturated with plaster of paris. This impure monomer was then used in processing a specimen; fogging did not occur.

It was demonstrated chemically that there is a definite loss of monomer from the resin dough into plaster when a barrier is not used between the plaster and the resin. The plaster forming the mold was analyzed after the processing of resin and was found to contain methyl methacrylate monomer.[7] It was thought that if the loss of monomer into the plaster of paris could be prevented or minimized, the resin could be made clear without using tinfoil. Various experiments were conducted to test this theory. The plaster mold was saturated with monomer on the theory that no more monomer from the resin dough could enter the plaster during polymerization. A catalyst (benzoyl peroxide) was dusted on the surface of the mold in an attempt to polymerize a thin skin of resin adjacent to the mold before the mass of

Fig. 3.—Two specimens of clear acrylic resin. A shows adherence of plaster to resin in isolated areas. There was no adherence on the opposite surface. B shows plaster of paris adhering to the entire surface of the resin, except where it has been removed from the upper left corner. The opposite surface of this specimen has no plaster attached. When viewed edgeways this specimen is saucer shaped, the plaster-coated surface being convex and the plaster-free surface concave

6. E. I. du Pont de Nemours & Company, personal communication.

7. Caul, H. J., and Schoonover, I. C., A Method for Determining the Extent of Polymerization of Acrylic Resin and Its Applications. (In press.)

resin polymerized; it was hoped that this skin would serve as a monomer barrier. In all experiments, the specimens came out fogged.

The smoothness or evenness of the surface affects the transparency. Resin processed against tinfoil has a comparatively smooth surface, whereas the surface processed against a painted-on film is not as smooth. The painted film, if heavy, shows brush marks; if thin, it follows the minute irregularities of the plaster surface.

Some specimens of clear resin processed against rubber dam turned pink. Soaking of various trade brands of rubber dam in the monomer did not cause any change in color. However, when polymer was added a reddish color developed immediately with all but one of the rubber dams tested.

Evidently some constituent of the polymer was responsible for the discoloration. It was reasoned that perhaps the catalyst used in the polymer to oxidize and thus to inactivate the inhibitor in the monomer was the agent responsible for the color change. This proved to be so, for when benzoyl peroxide, a commonly used catalyst, was added to the monomer in which the rubber dam was placed, the red color appeared in all the test tubes but one. It would seem, therefore, that the monomer was extracting a colorless agent from some rubber dams and that the benzoyl peroxide was oxidizing this colorless material, forming a red compound which caused the discoloration. All rubber dams tested produced surface strains in the resins. This will be discussed later in the section on surface strain.

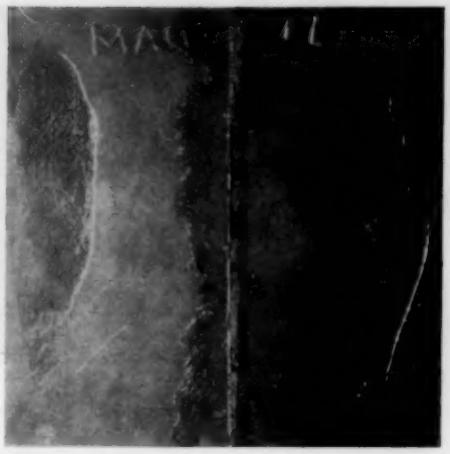


Fig. 6.—The left half of this block of clear acrylic resin was cut from a block processed against rubber dam; the right half was cut from a block processed against tinfoil. The halves were cemented together with methyl methacrylate monomer. Wherever monomer touched the half processed against rubber dam, severe crazing developed. Crazing never appeared on the tinfoiled side. When one of the so-called permanent relining materials was applied to a spot on each side, crazing developed only on the side processed against rubber dam

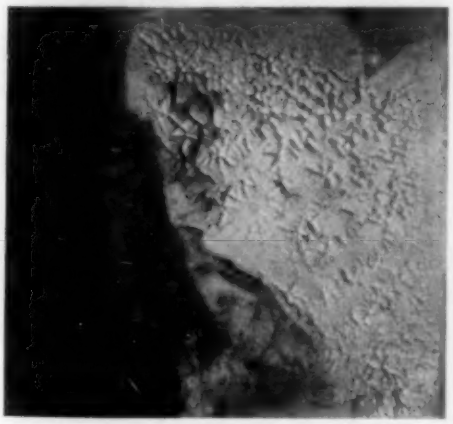


Fig. 5.—Block of clear acrylic resin with plaster attached to part of its underside. When a few drops of ethyl alcohol U.S.P. were applied to the plaster, cracks developed in the resin, demonstrating severe surface strain. When lighted obliquely and viewed from the plaster-free surface, these cracks have the appearance shown here

Adherence of Resin to Mold.—Although not shown in Figure 2, there were instances in which the resin adhered to the plaster of paris when the alginate substitutes were used. Usually the adherence

Fig. 7.—Specimen processed in injection type mold, the right half of which was lined with tinfoil and the left half of which was lined with tinfoil substitute. When monomer was swabbed on the surface crazing occurred only on the left side (the one processed against a tinfoil substitute)

occurred only in restricted areas, but at other times one whole surface was covered with plaster (Fig. 3). No attachment to plaster occurred when a "Nylon" solution, rubber dam, or tinfoil 0.001 inch thick was used, but these substances frequently stuck to the resin. The blocks which adhered to the plaster were badly warped, the plaster-coated surface being convex and the plaster-free surface concave (Fig. 3). The probable reasons are several:

1. The flash which is continuous with the top surface of the specimen block holds that portion of the resin tightly against the plaster and restricts the top surface from shrinking (Fig. 4). On the bottom surface shrinking is unrestricted and the resin does not adhere to the plaster.

2. Some monomer escapes into the plaster prior to complete polymerization of the resin. This monomer when polymerized forms a bond between the resin and the plaster of paris. Such a bond plus the mechanical interlocking of the minute irregularities on the plaster and resin surfaces make a strong union. Thus a differential thermal shrinkage takes place, and the piece warps in much the same manner that a bimetallic strip of brass and "Invar" warps on change of temperature because of the different coefficients of thermal expansion of the two alloys. The low-expanding plaster of paris which adheres to the top surface of the block of resin does not shrink as much on cooling as does the plaster-free surface of the block of resin.

3. The plaster-coated top surface of the block of resin does not lose as much water as the plaster-free bottom surface, nor is the water lost as rapidly from the top. This varying amount and rate of water loss on the two surfaces would cause a differential shrinkage, the bot-

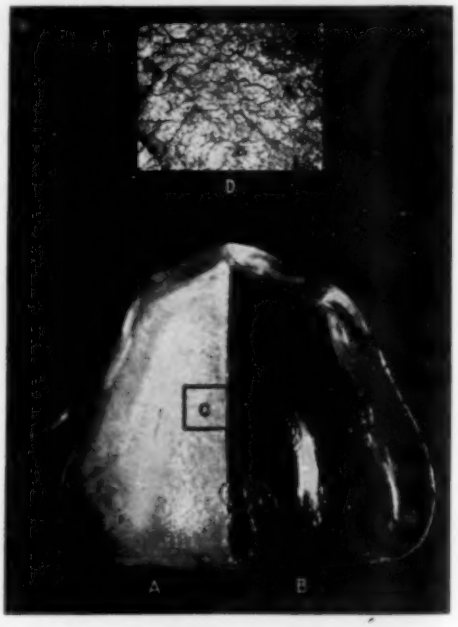


Fig. 8.—Denture blank form, one half of which, A, *was protected by a calcium alginate film during curing, while the other half,* B, *was protected by tinfoil. Note that* A *is blanched while* B *is clear. When a solvent was lightly brushed over the surface of the denture form, crazing developed on side* A *but not on side* B. D, *an enlargement of* C, *shows in detail the type of surface cracks that developed when the surface strain was released by a solvent*

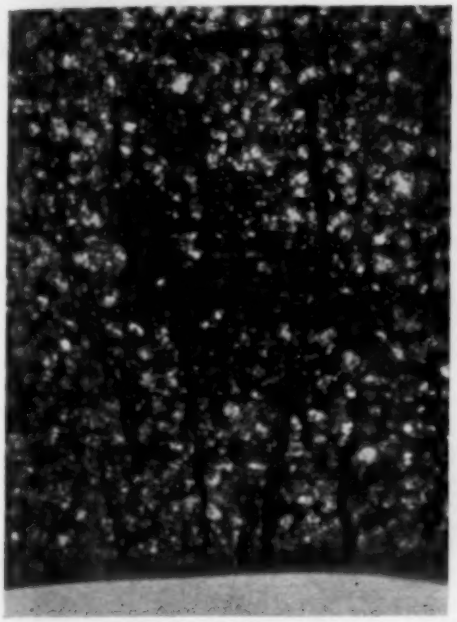


Fig. 9.—Magnified area from palatal surface (involving posterior periphery at the midline) of a technic denture of pink acrylic resin processed against alginate-type tinfoil substitute. The cracks developed when a solvent, applied to the surface of the resin, released strain produced during curing

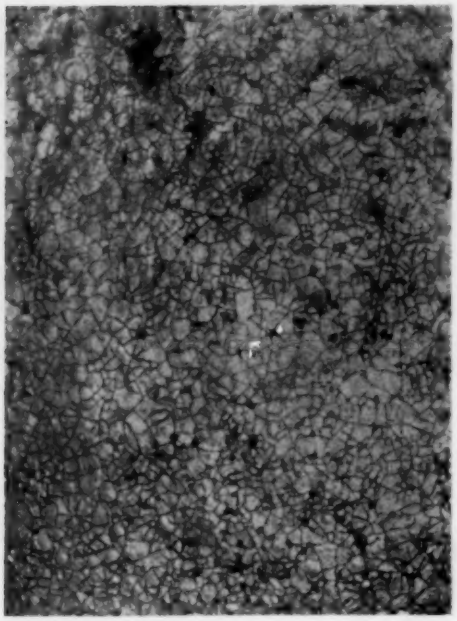


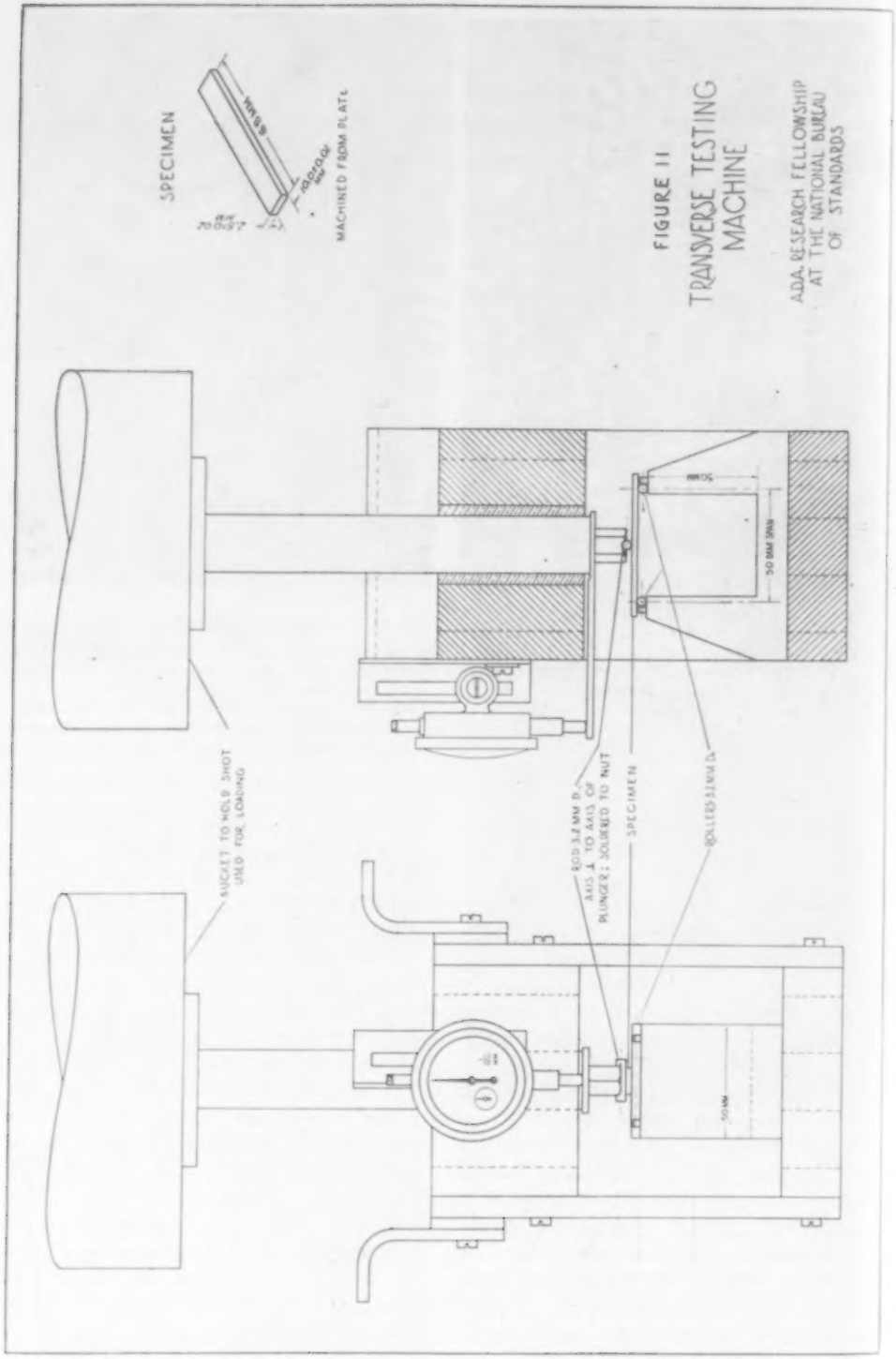
Fig. 10.—Enlarged view of the palatal area of a thick (5 mm.) experimental denture processed in a tinfoil-lined mold in 1941. This specimen was stored in air for six years. This fine and superficial type of craze pattern developed when a solvent was applied to the surface of the denture in 1946

tom surface shrinking more than the top surface.

Surface Strain.—One important observation that has not been previously reported in the use of tinfoil substitutes is the development of surface strain in resins processed against these substitutes and the absence of such strain when tinfoil is used.

The development of surface cracks when even a low grade solvent is applied to the surface of a cured resin is a well known test for detecting surface strain. Resin specimens processed by a compression technic and cured against tinfoil and its substitutes were tested by swabbing with a cotton applicator moistened with ethyl alcohol or methyl methacrylate monomer. In the flat specimens (Fig. 1) crazing was observed (1) wherever there was adherence of the resin to the plaster, as in Figure 5, (2) in three fourths of the specimens cured against rubber dam, as in Figure 6, and (3) in some of the specimens cured against alginate films and other substitutes. The same type of crazing developed when flat specimens were made by the injection technic (Fig. 7).

It was thought that this strain was caused in part by friction between the resin and the film and that more strain might be developed in a specimen having the shape of a denture than in a flat specimen. Therefore another series of experiments was performed using an upper denture form, half of which was protected by a substitute while the other half was protected by tinfoil (Fig. 8).


SPECIMEN
MACHINED FROM PLATE
FIGURE 11
TRANSVERSE TESTING MACHINE
ADA RESEARCH FELLOWSHIP AT THE NATIONAL BUREAU OF STANDARDS
BUCKET TO HOLD SHOT USED FOR LOADING
SPECIMEN
ROLLER SUPPORTS

As was predicted, there was more strain in the curved than in the flat specimen; in every instance severe crazing was observed in the half protected by the substitute and in no case was crazing detected on the tinfoiled side. Thus the practice of applying tinfoil to the lingual, buccal and labial surfaces of an upper denture and of not coating the palatal or tissue bearing surface with a protective film of any type is not logical. This attempt to produce a strain in a direction opposite to the strain developed during curing (thus to negate the warpage caused by shrinkage during processing) will do more harm than good, as surface strain will be produced on the palatal surface of the denture.

This surface strain is of utmost practical importance. A denture so strained will develop cracks on coming in contact with ethyl alcohol or other solvent. Such cracks materially weaken the denture. Furthermore it was observed in one experiment that the section of resin processed against tinfoil substitutes absorbed approximately three times as much water as the section of the same denture resin processed against tinfoil.

A technic denture was processed of pink acrylic resin in a compression-type plaster mold lined with an alginate film. This tinfoil substitute was one of the best of the alginate films as far as prevention of blanching and adherence of the resin to the plaster is concerned, yet severe surface cracks developed when the palatal surface was brushed with methyl methacrylate monomer. A magnified area from the posterior palatal portion of this denture is shown in Figure 9.

In the rebasing or the relining of dentures with the so-called permanent plastic lining materials, which contain resin solvents, crazing is encountered if surface strain is present. To show this action a commercial relining material was applied to each side of the block shown in Figure 6. Note that where strain was present the liner released it. Such action is typical.

In all the foregoing experiments strain was not detected on areas processed against tinfoil. Occasionally the surface of an acrylic resin which has been processed against tinfoil will show a very fine superficial crazing when a solvent is applied. This was true of an upper denture which was constructed in 1941 with porcelain teeth in half of the denture and acrylic resin teeth in the other half. This denture, approximately 5 mm. thick in the palatal area, was designed to show whether more strain would be encountered in the base resin surrounding the porcelain teeth than in the base resin around the acrylic resin teeth. When this denture was painted with monomer in 1946 fine superficial crazing developed uniformly over the entire surface (Fig. 10). The acrylic resin teeth checked severely.

Transverse Strength.—Strength and stiffness in transverse bending were determined in order to see if the mechanical properties of acrylic resin were influenced by the mold lining materials. Specimens (Fig. 11) were milled to the correct size from blocks of resin (Fig. 1). Some of the blocks were cured in molds lined with tinfoil, others in molds lined with various experimental and commercial film-forming substitutes (Table 1).

After being machined to size the specimens were immersed in water at body temperature (37 C.) for from two to four days, dried with a hand towel and immediately placed in the apparatus (Fig. 11). Loadings and observations were scheduled thus:

1. An initial load of 1,500 Gm. was applied.
2. Thirty seconds later the first reading on the dial gage was taken.
3. A 500 Gm. load was gradually added over a 30-second period by pouring shot into the bucket.
4. Thirty seconds later another read-

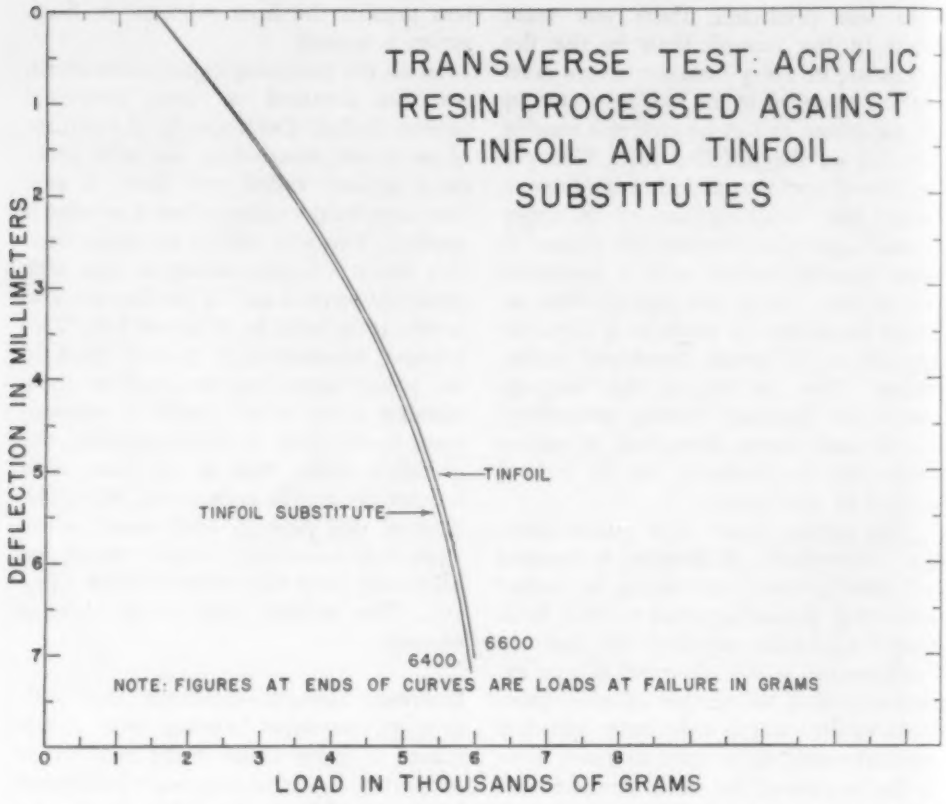


Fig. 12.—Curve showing data on transverse strength and stiffness of resins cured against tinfoil and tinfoil substitutes, except rubber dam

ing of the dial gage was taken.

5. Thereafter the foregoing loading and observation rate was maintained until the specimen broke.

None of the specimens was exposed to a solvent prior to testing.

The data on deflection versus load, for specimens machined from blocks processed in plaster molds lined with tinfoil and with tinfoil substitutes (except some brands of rubber dam) show that there is no significant difference in the stiffness or the strength in transverse bending among the various groups of specimens tested (Fig. 12).

Specimens prepared from blocks of resin processed in plaster molds lined with one brand of rubber dam gave substantially the same results as specimens processed against tinfoil and the tinfoil substitutes. However, specimens cured against rubber dam that discolored the resin had somewhat lower transverse strength.

It was reasoned that perhaps the rubber dam which discolored the resin might contain an agent that would retard or partially inhibit polymerization on the surface of the acrylic resin block. The effect of this surface inhibition might be reduced or lost when the specimen used in the transverse bending test was machined from the block because more than 1 mm. (0.04 inch) of resin was removed from each surface of the block in preparing the specimen. To avoid this, resin

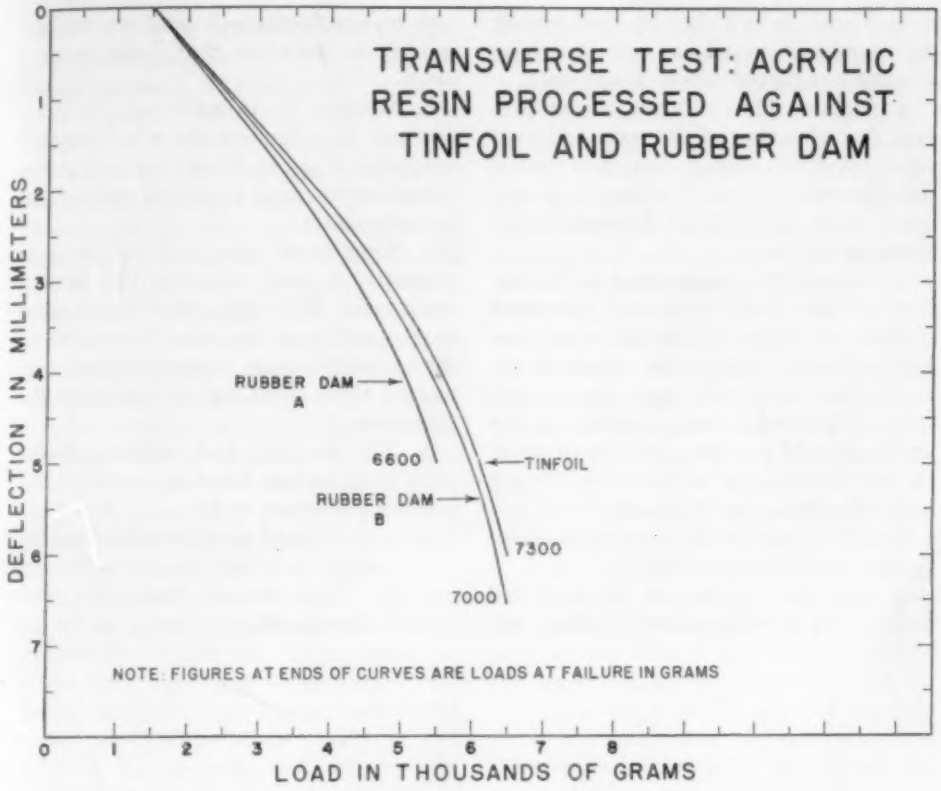

TRANSVERSE TEST: ACRYLIC RESIN PROCESSED AGAINST TINFOIL AND RUBBER DAM
DEFLECTION IN MILLIMETERS
LOAD IN THOUSANDS OF GRAMS
RUBBER DAM A
6600
TINFOIL
RUBBER DAM B
7300
7000
NOTE: FIGURES AT ENDS OF CURVES ARE LOADS AT FAILURE IN GRAMS

Fig. 13.—Curve showing data on transverse strength and stiffness of resins cured against tinfoil and two different trade brands of rubber dam. One of the rubber dams, A, *caused a pink discoloration of the clear acrylic resin and evidently interfered with the polymerization of the resin, as its strength and stiffness is somewhat lower than when another rubber dam,* B, *which did not discolor the resin, was used as a mold lining*

blocks the same size as that shown in Figure 1 except that they were only 2.60 to 2.65 mm. thick were prepared in molds lined with tinfoil and with rubber dams, some of which produced the discoloration of the resin and some of which did not. In finishing the test specimens to the specified thickness of 2.50 mm., plus or minus 0.03 mm., only 0.05 to 0.08 mm. was removed from each surface. Thus the skin effect would not be neglected. The data obtained from these specimens show that there was no essential difference in transverse strength and stiffness between specimens processed against tinfoil and against rubber dam which did not discolor the resin. Specimens processed against dams which did discolor the resin had lower transverse strength (Fig. 13).

Summary and Conclusions

1. Four experimental and fifteen commercial film-forming tinfoil substitutes and a preformed film, rubber dam, were tested to determine their relative effectiveness, as compared with tinfoil, in protecting acrylic resin when polymerized in gypsum molds.

2. None of the substitute films protected the resin from blanching or fog-

ging. Tinfoil is in a class by itself among the materials tested, as no blanching whatever occurred when it was used.

3. Alginate films did not always prevent the adherence of the resin and gypsum; "Nylon," rubber dam and tinfoil did. However, "Nylon," rubber dam and 0.001 inch thick tinfoil frequently adhered to the resin.

4. Severe strain was present on the surface of the resin specimens processed against all types of tinfoil substitutes tested. Surface strain was especially severe where the resin and gypsum adhered. This strain was detected by the application of a solvent to the surface of the acrylic resin, the strain being released with the formation of cracks. Such surface cracks may be the starting point of lines of fracture in a denture.

5. The use of any of the so-called permanent relining materials that contain resin solvents will produce surface crazing in dentures that have surface strain.

6. Molding by injection or compression did not significantly affect surface roughness, fogging, blanching and strain formation in resins processed against tinfoil substitutes.

7. Some trade brands of rubber dam produced a pink discoloration of the clear resin. This pink color was caused by the action of the catalyst present in the polymer upon some substance extracted from these rubber dams by the monomer.

8. The strength and stiffness of the resin in transverse bending were not significantly affected by the mold lining except in the case of some brands of rubber dam which lowered the strength and stiffness. These brands caused the clear resin to turn pink.

A COMPARISON OF THE EQUALIZATION OF PRESSURE BY MEANS OF THE CENTRAL BEARING POINT AND WAX CHECK BITES

Vincent R. Trapozzano, D.D.S., Philadelphia

THE importance of obtaining a correct maxillomandibular relation has been emphasized repeatedly, and no further comment as to its desirability is necessary. The following is a comparison of the merits and shortcomings of the use of a central bearing point tracer and of the wax centric check-bite technic in obtaining centric maxillomandibular relation.

By generally accepted definition, centric relation is the most retruded unstrained position of the heads of the condyles in the glenoid fossae, at any given degree of jaw separation, from which lateral jaw movement can be made. If one is interested only in registering the correct anteroposterior relation of the mandible to the maxilla, this definition is correct and descriptive of the

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objective of registering centric maxillomandibular relation. However, it is necessary not only to register the most retruded position of the mandible to the maxilla on a horizontal plane, but also to register equalization of pressure on the denture-supporting areas. To obtain proper anteroposterior positioning of the mandible in relation to the maxilla without this equalization of pressure would render the registration faulty, and would be reflected in the finished dentures in premature contact on one side of the arch and lack of contact on the other—in other words, would result in a strained relation. Any method or technic employed to register centric relation must, therefore, completely satisfy the requirements of correct anteroposterior positioning and equalization of pressure.

The necessity and desirability of the use of an arrow-point tracing for securing centric relation have been stressed so often that sight has been lost of the shortcomings and limitations encountered in the use of the various appliances and technics. It has been claimed that the arrow-point tracing is the only scientific and accurate means of establishing centric relation and, further, that all other methods are "inaccurate, unreliable and only guesswork." The reliability and scientific accuracy of the arrow-point tracing for determining the most retruded position of the heads of the condyles in the glenoid fossae will not be questioned. A sharp-pointed tracing does, beyond a doubt, represent their most retruded position. However, it is not at all certain that the known arrow-point tracing appliances make it possible to obtain centric relation as well as equalization of pressure.

Factors in Equalization of Pressure

Of relatively recent origin is the use of the central bearing point tracing device. Maxillomandibular separation is maintained by a single point of contact between two opposing plates, one of which is suitably prepared to indicate the tracing (intraoral). The tracing may be scribed extraorally by the use of a supplementary pin and tracing table, which extend outside the mouth (extraoral). On this single point of contact falls the function of providing jaw separation during eccentric movements of the mandible and of maintaining equalization of pressure.

It has been claimed that equilibrium by means of the central bearing point would be "assured." Theoretically, equalization of pressure would be "assured" under certain conditions. For example, proper equalization of pressure may be expected when the ridge relation is normal. However, when the ridge protrudes or retrudes, it follows that if the central bearing point were set in a position corresponding to the center of the bearing area of the mandibular arch, it would not make contact at a point corresponding to the center of the maxillary bearing area. Under these circumstances the slightest biting pressure exerted by the patient might result in a relatively excessive amount of pressure on the anterior or posterior parts of the ridges, and faulty equilibration of pressure would result.

If the bases were supported by bony structure, the application of pressure anywhere on the opposing ridge or bearing area would produce little or no dislodging or tilting of the denture bases. However, since the bases rest on tissue which may vary in density from almost cartilaginous to extremely soft and flabby, the bases always can be unevenly displaced by the application of pressure.

Despite off-ridge relation, it would still be possible to register centric equilibrium if the patient would exert no biting pressure at the time the ridge relation was being fixed. Fixing the relation records with a zero pressure would avoid the possibility of undue tissue displacement or the likelihood of tilting and sliding of

the bases to which the device is attached on the supporting tissues. It is not often possible to induce a patient to exert zero pressure and still maintain definite contact between the upper and lower members of the tracing appliance for even the relatively short period required to fix the relation by any method. This lack of cooperation need not be willful on the patient's part. The patient's conception of the amount of contact to be maintained may be radically different from the operator's idea, and therefore the pressure is difficult to control.

Regardless of the ridge relation or the relative amount of tissue displaceability, the angle at which the central bearing point strikes the opposing plate must be carefully considered. If the ridges are perfectly parallel and it is possible, therefore, to have the central bearing point come in contact with the opposing plate at a right angle, any pressure exerted by the central bearing point on the opposing plate directs the forces at a right angle to the ridges, and the bases tend to be seated. If, however, the central bearing point makes contact with the opposing plate at some angle other than a right angle, shunting of the bases is likely to occur. For example, if the plate is attached to the maxillary base and has a downward tilt posteriorly, pressure exerted on the plate by means of the central bearing point generates a force at a right angle to the point of application. This has a tendency to cause the maxillary base to be shunted distally, while the mandibular base is shunted anteriorly. This situation is another potential factor in failure to obtain equalization of pressure.

Wax Check-Bite

In order to check the factor of pressure equalization by the use of a central bearing point, it was necessary to use some other method for comparison. Such a method which itself is not open to considerable criticism has not, apparently, been available.

Much controversy has existed regarding the validity and accuracy of the wax centric relation check-bite technic for securing both anteroposterior relation and equalization of pressure.[1] The main criticism is that the method is not a scientifically accurate check for securing the correct anteroposterior relation. Another criticism is that no two wax or compound centric relation records are exactly alike. Its main advantage is that a material soft enough to secure records under a zero (or nearly zero) biting pressure can be used. Another advantage is that the record is made directly over the areas to be used for denture support. Thus, there is a better opportunity to obtain uniform distribution of the pressure that *may* be exerted when the record is being made. It was therefore decided to make a comparative study of the central bearing point arrow-point tracing technic with the wax centric relation technic. Much of the work here described was done by M. G. Swenson, Clyde Schuyler and me at the New York University clinic. I continued the study at the University of Pennsylvania clinic.

Method

The first step in the procedure is to adapt shellac baseplates to the finished casts. For the purpose of establishing a tentative centric relation and vertical dimension, more rigid basetrays than these are not essential. For reinforcement of the shellac baseplates, the excess material is turned over on itself at the periphery, and a rigid horseshoe-shaped wire is embedded in the lingual surface of the lower baseplate. Wax occlusal rims are next formed and sealed in position on the shellac basetrays. By means of the

1. This technic was first presented by Schuyler at the American Dental Association meeting in 1931. Schuyler, C. H., Intra-oral Method of Establishing Maxillomandibular Relation. *J.A.D.A.* 19:1012 (June) 1932.

occlusal rims thus formed, tentative centric relation is obtained. Care is taken to establish the correct vertical dimension at this time. A face-bow transfer is then made, after which the casts are mounted on an articulator.

Identical Baseplates.—The task of providing identical rigid baseplates on which to set the central bearing point tracing device and make a tentative setup of teeth is accomplished in the following manner:

Any severe undercuts on the casts are filled in with "Moldine." Shellac baseplates are then adapted to the maxillary and mandibular casts, care being taken to turn the excess material over on itself for added thickness and strength. The casts are next placed in hot water (about 180 F.) and allowed to remain there while tracing stick compound (medium fusing) is painted on the tissue surface of the baseplates to a depth of 2 or 3 mm.

The heated casts are then removed from the hot water, the excess moisture is wiped off and a layer of talcum powder is sprinkled on them. The compound-lined baseplate is then placed in position on the cast and carefully readapted. The retained heat of the cast is sufficient to cause the compound to flow and thereby produce a base which accurately copies all the fine lines on the cast. After the baseplates are thoroughly chilled, they may be removed from the cast without danger of distortion. Any excess material at the periphery is removed at this time. Thus are made two sets of baseplates which are accurately interchangeable and sufficiently rigid to eliminate the possibility of warpage during subsequent seating in the mouth if they are chilled in iced water from time to time.

Locating Center of Bearing Area.—Before attaching the central bearing point tracer on the lower basetray, it is necessary to locate the center of the bearing area of the mandibular ridge. This central point of bearing is located midway between the anterior and posterior portions of the lower bearing area and midway between the right and left ridges. The central bearing point is set to correspond to the point thus located on the cast. (It must be remembered that the extreme distal portion of the ridge, the area of the retromolar tubercle, often is not considered bearing area.) The upper plate is then set in position on the upper basetray. To secure added rigidity of the basetrays, compound is used to attach the tracer parts.

Procedure for Testing.—With the tracer parts attached, the upper and lower basetrays are seated in position in the mouth, and the arrow-point tracing is secured by having the patient make protruded, retruded, and right and left eccentric movements. The patient is instructed to make only light contact during these movements. No tracing is considered acceptable until it is clearly defined with a sharp apex. In order that the relation may be maintained, the patient is requested to close the jaws until only light contact is made. Care is taken that the tracer point coincides with the apex of the tracing. Quick-setting plaster is injected between the two plates of the tracer. After the plaster has set, the entire assemblage is removed from the mouth and sealed together with sticky wax. The lower cast is removed from the articulator and remounted to the new registration. On the other set of basetrays, a tentative setup of teeth is made on the mounting thus secured. The next step in the procedure is to check the centric relation thus obtained by the wax centric check-bite technic.

One criticism of the wax check-bite technic is that, because of the thickness of wax which must be placed between the teeth, the record is made at an increased vertical dimension. Unless the axis of rotation of the mandible has been determined and a record of the rotation

axis transferred to the articulator which would permit opening of the instrument (approximately 15 mm.) without change in the rotational center of the arc of movement, it must be assumed that there is a discrepancy between the original centric record and the new wax check-bite record.

In order that this possible discrepancy may be overcome, the vertical dimension established on the articulator is decreased 1 mm. With this adjustment the record obtained with the wax check bite should be at the same vertical height as is used when the central bearing point record is made.

Two layers of baseplate wax (total thickness 2 mm.) in a horseshoe shape are carefully sealed over the occlusal surfaces and incisal edges of the teeth of the lower trial denture. The wax is softened to a uniform depth by means of dry heat, and a centric relation record is made. At this first trial it often is found that the occluding teeth penetrate the wax strip at uneven depths. The excess wax around the tooth indentations is trimmed away and another centric relation record made. This procedure is repeated until there is uniform contact of the tooth cusps on the wax. The thickness of the wax at this time should not exceed 1 mm. In making the record, care must be taken that there is no direct tooth contact, since this might cause a shifting of the base in relation to the tissue, a change in the maxillomandibular relation, a strained relation or a decrease in the vertical dimension. The trial bases are then transferred to the articulator and the mounting checked. A record is not considered to have checked accurately on the mounting unless the same result is obtained with the duplicate record.

Results and Conclusions

In the first series of experiments, persons with the most favorable ridge relations for the use of a central bearing point were selected, that is, persons in whom the jaw relation was normal or nearly so. (Stated in another manner, the center of the bearing area of the mandibular arch coincided with the center of the bearing area of the maxillary arch.) The subjects were selected also for normal depth of mucosa, and those with hard, unyielding tissue or soft, flabby tissue were excluded. It was found, in all such persons, that an accurate check was obtained by the wax centric relation record when compared with the articulator mounting secured by means of the central bearing point tracer. From this, it was logical to draw two conclusions: First, that under the conditions stated it is possible to obtain equalization of pressure by means of the central bearing point; and second, that by means of the wax centric relation records, duplicate centric relation records can be made which check accurately with each other not only anteroposteriorly but for equalization of pressure.

In the second series of experiments, persons with off-ridge relations, that is, protruded, retruded and cross bite relations, were selected. In persons with hard and unyielding tissue, the two methods for securing centric relation checked accurately one against the other. This result was to be expected. Since the bases were resting on relatively unyielding tissues, pressure applied within the bearing area would transmit the same degree of pressure over the entire area covered, and the factor of equilibrium or equidistance would be maintained.

The results were quite different, however, for persons with off-ridge relations and tissue varying in resiliency from so-called normal to easily displaceable. In these, duplicate wax centric relation records checked accurately with the mounting secured by the use of the central bearing point for anteroposterior positioning but not for equalization of pressure. Repositioning of the central bearing point anteriorly, posteriorly or

laterally produced a record which still checked accurately with the wax check bite in the anteroposterior relation, but did not coincide with the wax check or with the central bearing point record obtained before the position of the central bearing point was changed, so far as equalization of pressure was concerned. Dentures remounted according to the wax centric relation were consistently rechecked with the other wax records obtained in the mouth.

With patients in the last group, the question arises whether the central bearing point record results in proper equalization of pressure or whether the wax record should be accepted as correct.

In considering this question, it should be recalled that in the first series the results were consistent, and one method checked against the other as to both anteroposterior positioning and equalization of pressure. Therefore, both methods must be considered accurate under the circumstances described.

In the second series, the variable factors between the methods were the amount of pressure exerted by the patient while the record was being made and the point of application of the pressure. It must be remembered that with the wax check-bite technic the records were made under minimum or no biting pressure, and therefore the presence or absence of tissue resiliency played a minimum part, whereas with the central bearing point technic the potentiality of greater and more unequal tissue displacement always was present because the patient had to maintain at least enough pressure to keep contact between the bearing point and the opposing plate.

Since it was possible with the wax centric check-bite technic to obtain records that repeatedly checked for both anteroposterior positioning and equalization of pressure, and since this was not possible with the central bearing point method so far as equalization of pressure was concerned, it seems logical to conclude that the wax check bite is the more reliable technic for registration of this factor. Despite this apparent drawback to the use of a central bearing point tracer, in my clinical experience records made by students using a central bearing point arrow-point tracing device have proved correct a greater number of times than records made by means of the wax check-bite technic. Considerable experience is necessary for making adequate wax check-bite records.

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Defects of Speech.—A defect of speech is a mental, social and economic handicap, resulting in embarrassments and disturbances in family, industrial and political life. Many scientists are convinced that the factors involved in speech difficulties are primarily mental or emotional.

Functional impediments to speech, such as chronic hoarseness and phonasthenia, Froeschels believes are the result of phobias due to hyperfunction or hypofunction of the vocal apparatus. (Hygiene of the Voice, *Arch. Otolaryng.* 38:122, August 1943). The hyperfunction produces the impression of strain; the hypofunction, an impression of flabbiness. Among the psychogenic troubles of the voice, spastic and paretic aphonias are included. Analysis of the voice of nursing infants shows that they have two different cries; one has a soft beginning and the other a hard beginning. The soft onset is significant of a good mood, but the hard one indicates distress.—*"Hygiene of the Voice," editorial, J.A.M.A. 135:1154, December 27, 1947.*

HEALTH AND SOCIAL SECURITY

Morris Fishbein, M.D., Chicago

This is one of several articles prepared especially for THE JOURNAL to acquaint members of the Association with various aspects of the health problem of the United States. Proponents of compulsory health insurance would have the public believe that little is being done by the government to relieve suffering from sickness and want. Actually this is not the case. The government's financial contribution to health and social welfare in 1948 reached the grand total of $14,000,000,000, approximately $100 for every person in the country.—*Editor's note.*

FEW persons realize how greatly government enters into health and welfare activities for the American people under existing legislation. Both in dollar expenditures and in number of persons directly served by the government, the wide range of activities goes almost beyond the comprehension of a single human being. Furthermore, the programs of the government are so widely scattered among federal, state-federal, state, county and local agencies that it is well-nigh impossible to establish a completely accurate count either of number of persons covered or of total money expenditures.

A further strain on comprehension comes when one attempts to assimilate the data concerning the place of private medical and dental care in the total American economy. Yet in considering both governmental activity and private enterprise in medicine it is necessary to talk of millions of persons and billions of dollars. With scales and dimensions of this level it may be possible to obtain the needed perspectives for evaluating the nation's health achievements and future progress.

Governmental Expenditures for Health

The much quoted Ewing report[1] presented a simple summation of current governmental expenditures for civilian health (Table 1). In 1947, the federal government spent about $743 million for civilian health activities, directly through its own departments or indirectly as grants to state and local health agencies. State and local governments spent almost $1.2 billion during the same year for health and medical care activities. Thus, expenditures of federal, state and local governments combined amounted to almost $2 billion in 1947. Some question may be raised concerning the inclusion of veterans' medical care as a civilian health expenditure of the federal government. This item, amounting to almost $500 million in 1947, might be consid-

Prepared with the assistance of the staff of the Bureau of Medical Economic Research, American Medical Association, Frank G. Dickinson, Ph.D., Director, and with the particular aid of Joseph E. Bagdonas, formerly secretary, Committee on Dental Economics, American Dental Association.

Editor, The Journal of the American Medical Association.

1. Ewing, O. R., *The Nation's Health, A Ten Year Program: A Report to the President.* Washington, D. C.: U. S. Government Printing Office, 1948, p. 28.

ered more properly a cost of war. It constituted two thirds of all federal expenditures for health and medical care, and would deflate appreciably the amount which the government expended for the benefit of the nation as a whole. Although its inclusion as a "health" expenditure may be questioned on the basis of principle, it will be retained in this discussion for other reasons.

These expenditures encompassed a broad range of activities. At the federal level, a large proportion of the appropriations for the United States Public Health Service and the Social Security Administration were earmarked for grants-in-aid to the states for community health activities, for research and for training of specialized personnel. During 1948, Congress appropriated about $175 million for varied activities, including the following:

Control of venereal diseases	$17,230,000
Tuberculosis control	9,291,000
General public health work	13,865,000
Control of communicable diseases	7,490,000
National Institute of Health (medical research)	13,670,000
Cancer research and control	14,000,000
Hospital construction program	40,000,000
Construction of a medical research center	40,000,000
Maternal and child health services	11,000,000
Services for crippled children	7,500,000[2]

New programs initiated by the last Congress included the National Dental Research Act, with an appropriation of $750,000; an additional million dollar appropriation was made for field demonstration work in the use of sodium fluoride to prevent dental caries. Congress also voted $3 million to intensify research, detection and treatment in cardiovascular disease and more than $5 million for an expanded mental health program.

States and communities participate in the operation of these programs. Their major burden, however, lies in the field of providing medical and institutional facilities and care for the insane, the tuberculous and the indigent sick. In 1947, for

2. *Social Legislation Summary.* Washington, D. C.: Social Legislation Information Service, Inc., 1948.

Table 1.—Government Expenditures for Civilian Health, 1947

	Federal	State and Local	Total
Medical care of the needy (noninstitutional)	$ 25,000,000	$125,000,000	$150,000,000
Community health protection	69,000,000	247,000,000	316,000,000
Rehabilitation	18,000,000	7,000,000	25,000,000
Hospitals:			
Authorized construction	77,000,000	150,000,000	227,000,000
Maintenance of hospitals for tuberculous, mental and chronic patients		373,000,000	373,000,000
Maintenance of general hospitals		300,000,000	300,000,000
Maintenance of federal establishments, including veterans' medical care	534,000,000		534,000,000
Health manpower (training)	(*)	15,000,000	15,000,000
Research	20,000,000	2,000,000	22,000,000
Total	$743,000,000	$1,219,000,000	$1,962,000,000

*Less than $1,000,000.

Table 2.—Average Daily Census and Total Yearly Admissions in Governmental and Nongovernmental Hospitals, 1947, by Type of Service

Type of service	Governmental		Nongovernmental	
	Average census	Yearly admissions	Average census	Yearly admissions
General	191,676	3,580,422	265,085	11,084,773
Nervous and mental	635,702	217,360	15,876	74,594
Tuberculosis	53,102	83,302	9,473	15,778
Special	10,525	201,053	21,051	431,956
Institutions	13,598	122,207	1,141	18,069
Total	904,603	4,204,344	312,626	11,625,170

instance, federal government hospitals constituted about 21 per cent of total hospitals operated by any type of governmental unit, while state and local government hospitals made up the remaining 79 per cent. In terms of total admissions to hospitals, the federal hospitals served 31 per cent of the need, and state, county and city hospitals, 69 per cent. Of a total of almost 1.5 million beds in all hospitals, 213,000 were under federal control, 395,000 under nongovernmental control and 817,000 under the control of state and local governments. The importance of all governmental hospitals in providing care for long term illnesses is reflected in Table 2,[3] where data are presented on average daily census and total yearly admissions in various types of public and nonpublic hospitals. More than three quarters of all patients with nervous and mental disease and tuberculosis were housed in state, county and city operated hospitals.

Consumer Expenditures for Medical Care

Each year, the United States Department of Commerce reports estimates of consumer expenditures for all categories of goods and services. For 1947, it reported total consumer expenditures of $164.8 billion.[4] Of this amount, $6.5 billion represented expenditures by individual families for all types of medical care. Included were detailed estimates of amounts spent for drug preparations and sundries, physicians' and dentists' services, privately controlled hospital and sanitarium confinement, eyeglasses, orthopedic appliances, net payments for group hospital and health insurance, services of chiropractors, chiropodists, private duty nurses and practical nurses and certain miscellaneous items. Table 3[4] presents the full series of medical care items and the estimates of expenditures for 1947.

The $6.5 billion which consumers voluntarily allocated from their available funds to purchase medical, dental and other health services and goods which they needed and desired is almost nine times the amount expended in the same year by the federal government for health activities and more than three times the amount appropriated by all units of government in the United States. This is not intended as a criticism of the extent to which governmental agencies participate in medical care activities; it is purely an exposition of the contribution made by private action in meeting the medical needs of the American public, as con-

3. Arestad, F. H.; Leveroos, E. H.; Albus, W. R., and Corbett, W. W., Hospital Service in the United States: Twenty-Seventh Annual Presentation of Hospital Data by the Council on Medical Education and Hospitals of the American Medical Association. *J.A.M.A.* 137:1385 (Aug. 14) 1948.

4. U. S. Department of Commerce, *Survey of Current Business, Dec. 1947-June 1948.* Washington, D. C.: U. S. Government Printing Office, 1948.

trasted with the contribution of the agencies of government. Each class of contribution met the special and peculiar needs of a certain portion of the population and often supplemented a contribution of the other class. Together, they made up the dollar value of the total amount of medical and health service rendered in this country. Out of every dollar spent by the consumer, 4 cents went toward the purchase of a medical care item; out of every dollar paid by the consumer, business and industry as a tax, the government allocated slightly more than 4 cents for medical and health purposes. The total health expenditure of both amounted to $8.4 billion.

Social Security and Welfare Expenditures

Outside the area of health and medical care, the problems of subsistence and security for larger and larger portions of the total population have been increasingly the concern of federal, state and local governments. Before the great depression of the 1930's, assistance to the aged and indigent was principally a local problem, handled by voluntary charitable contributions and modest community tax revenues. As the costs of relief rose during the depression, state governments and the federal government assumed additional responsibilities, first on an emergency and later on a permanent basis. With the passage of the original Social Security Act in 1935, an integrated national system of assistance and social insurance was established. Federal emergency aid, in the form of appropriations for cash relief and for work programs, amounted to $1.4 billion in 1933. In 1936, the first year of operation of the Social Security program,

Table 3.—Consumer Expenditures for Medical Care, 1947

	Billions of dollars	Percentage of total medical care
Total medical care expenditures	6.507	100.0
1. Drug preparations and sundries	1.355	20.8
2. Ophthalmic products and orthopedic appliances	0.383	5.9
3. Physicians	1.656	25.5
4. Dentists	0.907	13.9
5. Osteopathic physicians	0.098	1.5
6. Chiropractors	0.063	1.0
7. Chiropodists and podiatrists	0.030	0.5
8. Private duty trained nurses	0.095	1.5
9. Practical nurses and midwives	0.094	1.4
10. Miscellaneous curative and healing practitioners	0.031	0.5
11. Privately controlled hospitals and sanitariums	1.333	20.5
12. Net payments to group hospitalization and health associations	0.067	1.0
13. Student fees for medical care	0.003	0.1
14. Accident and health insurance—net payments	0.342	5.3
15. Mutual accident and sick benefit associations—net payments	0.050	0.8

the federal government appropriated $681 million toward cash assistance programs. The next year the first payments were made under the old age and survivors' insurance provisions, a total of $1.3 million. In subsequent years assistance payments have remained at substantially the same level, while old age insurance benefits have multiplied rapidly. In 1947, payments to the states amounted to $644 million for old age assistance, aid to the blind and aid to dependent children. Old age and survivors' insurance benefits in the same year had risen to $412 million.

By no means does this represent the extent of activity of government in social insurance and welfare. Current monthly figures on expenditures and beneficiaries of federal and state programs are presented in Table 4.[5] In September 1948, almost 6 million persons were receiving pension payments from federal social insurance programs; an additional 4 million persons were receiving welfare payments from state-federal funds; about 1.3

5. Current Operating Statistics, *Social Security Bulletin* (Nov.) 1948.

Table 4.—Total Monthly Expenditures and Number of Beneficiaries Currently Receiving Government Pensions, Social Insurance and Welfare Payments, September 1948

	Monthly expenditures	Number of persons
Federal Contributory Plans for Aged		
Social Security Act		
a) Old age benefits—wage earner and dependents	$ 29,745,000	1,335,200
b) Survivors' benefits	14,184,000	892,400
Railroad Retirement Act		
a) Old age benefits—wage earner and dependents	18,438,000	221,400
b) Survivors	2,732,000	108,400
Civil Service, retired and disabled	12,700,000	132,500
Federal Noncontributory Plans for Veterans and Indigent		
Veterans' pensions and compensation	134,633,000	2,297,600
Aid to surviving dependents of veterans	37,396,000	950,400
Old age assistance	96,635,000	2,446,700
Aid to dependent children	30,492,000	1,160,300
Aid to the blind	3,502,000	84,500
State Welfare Plans		
General assistance	15,872,000	358,000
Cash Sickness Plans—State and Federal		
California, Rhode Island	2,341,000	27,900
Railroad employees	3,198,000	36,800
Unemployment Compensation—State and Federal		
State benefits	59,797,000	775,800
Servicemen's readjustment benefits	35,325,000	437,800
Railroad employees' benefits	1,576,000	25,100
Total	$498,566,000	11,290,800

million persons were receiving unemployment compensation payments under state, railroad and veterans' legislation, and about 65,000 persons were receiving cash sickness benefits under state and railroad legislation. Thus, in September 1948, a total of 11 million persons were receiving benefits under social insurance, pension and welfare plans operated by several federal agencies and the forty-eight state governments. Some duplication of persons may have existed between various programs, but it is debatable whether this was large enough to affect the figures to any significant extent.

The aggregate monthly benefits under all these programs amounted to $499 million. For purposes of rough approximation, this figure may be multiplied by 12, making almost $6 billion per year. During the first six months of 1948, 100,000 additional workers and dependents became eligible for Social Security payments; an additional 50,000 survivors of covered workers were added in the same period.

On any given day, about 1 million persons are receiving in-patient care in government-operated hospitals or as public wards in other hospitals. As indicated earlier (Table 1), almost 750,000 persons are patients in institutions for mental disease and tuberculosis. The average daily census of almost 200,000 patients in general hospitals represents the portion of service being given on any single day to persons from the population at large. Because of much more rapid turnover in the course of a year, the latter figure represents many more persons, and from year to year this turnover will include more and more different individuals from all walks of life, with major and minor health problems. Adding 1 million hospitalized patients to the 11 million receiving cash benefits results in a total of 12 million public charges, a conservative figure. Another 500,000 persons are inmates of state and local prisons and homes for the aged, needy and infirm.[6]

The Summing Up

A certified public accountant might be able to interpret the highly complex accounting report which constitutes the 1,500 pages of the budget of the United States government for this year. However, the ordinary layman or practitioner would find himself over his head in complex bookkeeping transfers, adjustments and various other legitimate though involved paper procedures. The closest that one can come to establishing the total expenditures of the federal government for health and welfare appears in the introductory portions of the budget message. The estimated expenditures in the fiscal year 1948 for social welfare, health and security (primarily Federal Security Agency expenditures) amounted to almost $2 billion, not including (apparently) the benefit payments to individuals, which are charged against trust accounts. Veterans' services and benefits were estimated at $6.6 billion, again excluding benefit (insurance) payments from trust accounts. These two agencies thus accounted for more than $8.5 billion of expenditures; to these properly can be added $4.5 billion of benefit payments under the various Social Security programs.

Medical and welfare expenditures by other agencies of the federal government were substantially smaller, and often diffused among many departments. Two rather important items can be separated out: The current expenditures of the medical departments of the armed forces included an estimate for the Army of $70 million and for the Navy of $38 million. Most of the services of the Bureau of Indian Affairs can be termed welfare activities, and represented almost $38 million, of which more than $8 million

6. U. S. Bureau of the Census. *Statistical Abstract of the United States: 1947*. Washington, D. C.: U.S. Government Printing Office, 1947, p. 57. In 1940, 218,000 were in state and federal prisons, 99,000 in local jails and 945,000 in homes for the aged and the like.

were direct health and social service expenditures.

Adding all these results in a total of $13.2 billion which can be directly identified as federal health and welfare expenditures. It should be emphasized that this does not include many additional social programs, such as expenditures for housing, general education and various research and service activities related to maintenance of health or well-being of the public. For instance, the last classification would include control of disease among livestock, sanitation and health educational activities of personnel connected with the Department of Agriculture and other agencies.

These data furnish the perspective for viewing proposals for supplementing, expanding or introducing programs of social aid. If the field of health and medical care alone is considered, the principal mode of operation entails individual and personal responsibility for purchase and consumption. Dollar-wise, three quarters of all health and medical care functions in the United States are provided through individual transactions and one quarter through the agency of federal, state and local governments. In the area of welfare, the agencies of government have gone some distance in providing security through the institution of cash type programs of contributory social insurance against old age, disability, dependency, unemployment and, to a limited extent, sickness. During the last two decades, fiscal responsibility for various classes of indigents has passed increasingly from the community to the state and to the federal government. While the costs of subsistence are shared almost equally by federal and state-local governments, the costs of health and medical care for the indigent are yet almost entirely the responsibility of state and local governments. Even in the area of capital outlays for hospital construction, state and local governments continue to carry the principal burden. The Hill-Burton Hospital Construction Act requires a contribution of approximately $2 by the state and local governments for each dollar available from the federal government. A recent proposal from the Advisory Council on Social Security to the Senate Committee on Finance called for a fifty-fifty matching of state and federal funds to provide supplementary payments for medical care in welfare cases, up to a maximum monthly total of $6 per case.

These are the details in the present program of government in health and welfare. On any given day this year, approximately 14 million persons will be receiving direct social security, veterans', subsistence or other welfare or health benefits as pensioners, dependents, wards, institutional inmates or members of the country's armed forces. This is 10 per cent of the total American population. Public health and welfare expenditures, including federal, state and local funds, were in excess of $14 billion in 1948. In addition, personal consumer expenditures for medical care were $6.5 billion.

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Oral Manifestations of Metallic Poisoning.—The mouth is frequently a site for early recognition of effect from occupational hazards. Stomatitis and excessive salivation are early signs of mercurial poisoning. If the physician does not learn from the patient's occupational history that there is an exposure to mercury in his work the condition might well be and frequently is treated as an infection or nutritional deficiency.

The metallic line which appears on the gingival margins is commonly an early sign of plumbism, but it may also be an indication of extensive treatment with bismuth compounds. It is important to learn the cause.—*H. T. Castberg, "Occupational Disease in Differential Diagnosis," Industrial Hygiene Newsletter, June 1948, p. 6.*

TYROTHRICIN AND THROMBIN IN EXODONTIA

Sidney Epstein, D.D.S., San Francisco

DENTAL literature is replete with suggestions for various forms of medication to control hemorrhage and to reduce postoperative pain and infection. Many substances entirely foreign to the normal blood clot have been introduced into the alveolus from which the tooth was removed. The substances include waxes, zinc oxide-eugenol cements, anesthetic powders and pastes, sulfonamides in powders and cones, and oxidized cellulose. Several dried constituents of normal blood, such as thrombin and fibrin, also are used.

It has been suggested that the local use of antibiotics may have some value in preventing infection and lysis of the blood clot during the healing of the dental alveolus. Penicillin has been used in lozenges, troches, cones and dusting powder, alone or in combination with a sulfonamide.

Recently an opportunity was offered to test under clinical conditions another antibiotic, tyrothricin, used together with human thrombin.[1] The two agents in combination were formed into wedge-shaped tablets about 3 mm. thick, with the base about 4.5 mm. long and the sides about 8 mm. long. According to the manufacturer, each tablet contained 1 unit of lyophilized human thrombin, 1 mg. tyrothricin and a series of vegetable gums to provide expansion of the tablet in the alveolus. The manufacturer said that the preparation was free from all contaminants and pathogenic organisms, but that strict surgical aseptic technic was not followed in packaging.

Thoma[2] in 1945 reported using similar thrombin-tyrothricin tablets on 16 patients, with good results in control of bleeding and healing. Kaplan[3] in 1947 reported variable and rather inconclusive results in use of these agents to control postoperative hemorrhage in 100 patients. Cannon[4] in 1947 reported on the use of thrombin-tyrothricin in a series of 205 patients with multiple extractions and 185 with single extractions. In this series only 1 dry socket occurred, in contrast to a series of 405 patients treated with sulfanilamide and sulfathiazole, among whom there were 7 dry sockets.

The rationale for use of the preparation may be outlined as follows:

1. Active human thrombin is a hemostatic agent, in that it is a normal constituent of clotting blood.

2. Human thrombin is species-specific and thus avoids the inherent pharmacologic dangers of sensitization.

3. Introducing thrombin into the socket might provide a meshwork to increase the firmness of the clot and thus prevent dry socket.

4. Tyrothricin is an antibacterial agent, is stable at room and body tem-

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1. The preparation was manufactured and submitted for clinical research study by Sharp & Dohme, Inc., Philadelphia.

2. Thoma, K. H., A New Method of Space Obliteration After Odontectomy. *Am. J. Orthodont. & Oral Surg.* 31:198 (April) 1945.

3. Kaplan, S. I., Thrombin Tyrothricin Cones. *D. Survey* 23:635 (April) 1947.

4. Cannon, J. T., An Evaluation of Thrombin-Tyrothricin and Selected Antibacterial Agents in Post-extraction States. *Pennsylvania D. J.* 14:991 (May) 1947.

peratures and is effective against most pathogenic gram-positive organisms, certain gram-negative cocci (meningococci and gonococci) and anaerobic streptococci.[5, 6]

5. Tyrothricin is clinically effective in concentrations of 0.5 mg. per cubic centimeter, and the concentration in the tablets should be sufficient to allow for dilution by saliva or the presence of necrotic tissues and suppurative detritus.

Method

The study was done according to the following procedure: Whenever possible, patients requiring bilateral extractions were used. One side was treated with the thrombin-tyrothricin tablets and the other was left untreated. By this method it was possible to use each subject as his own control. No placebos were available at the time, so that it was not possible to study separately the effect of each factor in the tablet. After extraction of a single-rooted tooth one tablet was used; two or three were placed in the socket of a multi-rooted tooth. The area was then covered and compressed with a small sterile gauze sponge. Patients were instructed to leave the sponge in place for one hour and not to rinse the mouth until the following day. Tablets usually were moistened with sterile water before being placed in the tooth socket, but some were placed without previous moistening. The unmoistened tablets appeared to swell to the limits of the alveolus about as rapidly as the moistened ones.

The teeth extracted did not present any serious or unusual acute or chronic disease except extensive caries or paradentosis. Some were impacted. The number of cases included in this report is small in terms of what may be called statistically significant numbers for evaluating a drug. However, in terms of clinical experience, the results were sufficient so that the investigation was discontinued and the following report prepared.

Results

Fifty patients were treated by the method described; 50 controls received no treatment. In no instance in the treated sites was it possible to demonstrate an alveolus completely filled with a firm blood clot after 48 hours. At 24 hours some of the unpermeated tablet remained in the alveolus. Patients complained of pain and soreness in the treated areas. Examination revealed a normal appearing wound with healing around the walls of the alveolus but with a central space filled with serous fluid. When multiple extractions were done bilaterally, as in the removal of all mandibular teeth, the tissue on the treated side was necrotic and covered with a gray slough. There was a characteristic fetid odor. The untreated area was normal in appearance, and no discomfort was reported.

At the end of one week, the treated alveoli showed some organization around the lateral circumference, with granulation and normal healing processes taking place. The central area was free from any clot. The alveoli, because of this partially organized lining, could not be termed true dry sockets. However, the rate of healing was appreciably slower than normal. If the tyrothricin did actually remain in any concentration, it apparently exerted sufficient bacteriostatic effect to control sepsis. About 10 per cent of patients became sufficiently uncomfortable to require some form of sedative treatment.

Discussion

Apparently the mechanism can be explained as follows: As blood flowed into the alveolus after removal of the tooth,

5. Heilman, D. H., and Herrell, W. E., Comparative Antibacterial Activity of Penicillin and Gramicidin: Tissue Culture Studies. *Proc. Staff Meet., Mayo Clinic.* 17:321 (May 27) 1942.

6. Rammelkamp, C. H., Use of Tyrothricin in Treatment of Infections: Clinical Studies. *War Med.* 2:830 (September) 1942.

the tyrothricin-thrombin tablet was moistened by the blood and began to expand. As it expanded, it displaced a considerable amount of the blood that would normally fill the alveolus. The remaining blood coagulated and formed the matrix for normal physiologic repair. Even when previously moistened, however, the tablet did not absorb sufficient blood to be thoroughly permeated and permit continuation through it of the fibrin matrix that would allow for subsequent formation of connective tissue. Instead, it acted somewhat like a foreign body, hindering rather than helping the formation of a firm, continuous clot.

The tablet has no special hemostatic properties other than the mechanical pressure of the expanding dehydrated thrombin. In 3 patients in whom bleeding was prolonged it was necessary to use other means to control hemorrhage.

Further studies are indicated to test the value of tyrothricin in control of sepsis in exodontia. Impregnation of human fibrin foam or oxidized cellulose with the antibiotic may prove of some merit.

Tyrothricin is an effective antibacterial agent, especially indicated for local application. Grolnick[7] reported that within the limits of described experiments he was unable to demonstrate sensitivity to tyrothricin after repeated applications of varied concentrations to the skin. Cannon[4] stated that in his review of the literature he could find no reported cases of sensitivity to tyrothricin. If dental uses can be found for the preparation, it may possibly be used widely without the dangers of sensitivity always inherent in the indiscriminate topical use of sulfonamides and penicillin.

Summary

Tablets containing tyrothricin and human thrombin were tested in 50 cases of exodontia. The preparation was not readily assimilated into the normal clot and delayed physiologic healing. Further study is needed to determine the value of tyrothricin as an antibacterial aid in exodontia and to evolve efficient modes of application of the preparation.

7. Grolnick, Max, Studies to Determine the Ability of Tyrothricin to Sensitize the Skin. *J. Allergy* 17: 984 (September) 1946.

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Hypersensitivity to Local Anesthetics.—A large proportion of the individuals who are hypersensitive to procaine (Novocain) are also hypersensitive to butethamine (Monocaine), tetracaine (Pontocaine), butacaine (Butyn) and other compounds of similar chemical structure. Butamin (Tutocaine hydrochloride) and Metycaine hydrochloride N.N.R. have been used successfully by some dentists who are unable to tolerate the more commonly used local anesthetics.

Dentists who suffer from occupational dermatitis are requested to write to the Council on Dental Therapeutics, 222 E. Superior St., Chicago 11, Ill. The Council is conducting a study of this subject.—*Accepted Dental Remedies, edition 14, page 41.*

AMALGAM ALLOY: ITS HEAT TREATMENT, FLOW, MERCURY CONTENT AND DISTRIBUTION OF DIMENSIONAL CHANGE

K. H. Strader, B.S., M.S., Pittsburgh

For some time I have been engaged in a study of the amalgam alloy system, silver-tin-copper-zinc. The problem has been attacked from the standpoint of physical metallurgy, and is an apparently logical continuance of the basic work done at the National Physical Laboratory in England by Murphy.[1] The work here described was carried on from 1936 to 1938, and a preliminary report was made at the 1939 meeting of the International Association for Dental Research, Materials Group.

Although the two studies have the same goal, work of this nature is not to be confused with studies on the technics of amalgam manipulation. My aim was to produce an amalgam alloy which combined the optimum in physical properties with possibilities for greater latitude in the technic of mixing. That few amalgam alloys available today approach this ideal is too well known to require explanation; that the goal of this study has been achieved will be demonstrated.

The "optimum of physical properties" is taken to be properties that comply with Specification No. 1 established by the American Dental Association fellowship at the National Bureau of Standards. All alloys studied were of the "high silver" classification, with routine anneal of cuttings for 120 minutes at or near 100 C. to release strain or work hardness. The linear change limits set up in the specification were observed, but without preference for any particular region. However, an attempt was made to keep flow or creep at about 1 per cent. The ideal would probably be nil, but in such materials as amalgams, the brittleness accompanying zero flow might tend to cause failures.

After an analysis of the factors involved, an investigation was made of the effect of structural modifications, accomplished by ingot heat treatment, of the original as-cast alloy on the final amalgam. One of the most important aids to this study was the publication by Murphy[1] of a reliable phase diagram for the silver-tin system (Fig. 1). Without this diagram, any of the results of my study would have been accidental rather than predictable.

The diagram shows that the gamma constituent occupies a very narrow field. From a metallographic study of various alloys available to the profession, it was determined that a high percentage of each alloy was not of this structure. The gamma constituent is of utmost importance, as it is probably responsible for the desirable properties of the final amalgam. The problem, therefore, resolved itself into the determination of the heat treatment which would transform casting structure into the gamma crystal form to the greatest possible degree. (Previously, comparisons of casting methods

Vice-president, Lee S. Smith & Son Mfg. Co.

1. Murphy, H. A., The Constitution of the Alloys of Silver and Tin. *J. Inst. Metals* 35:107 (Jan.) 1926.

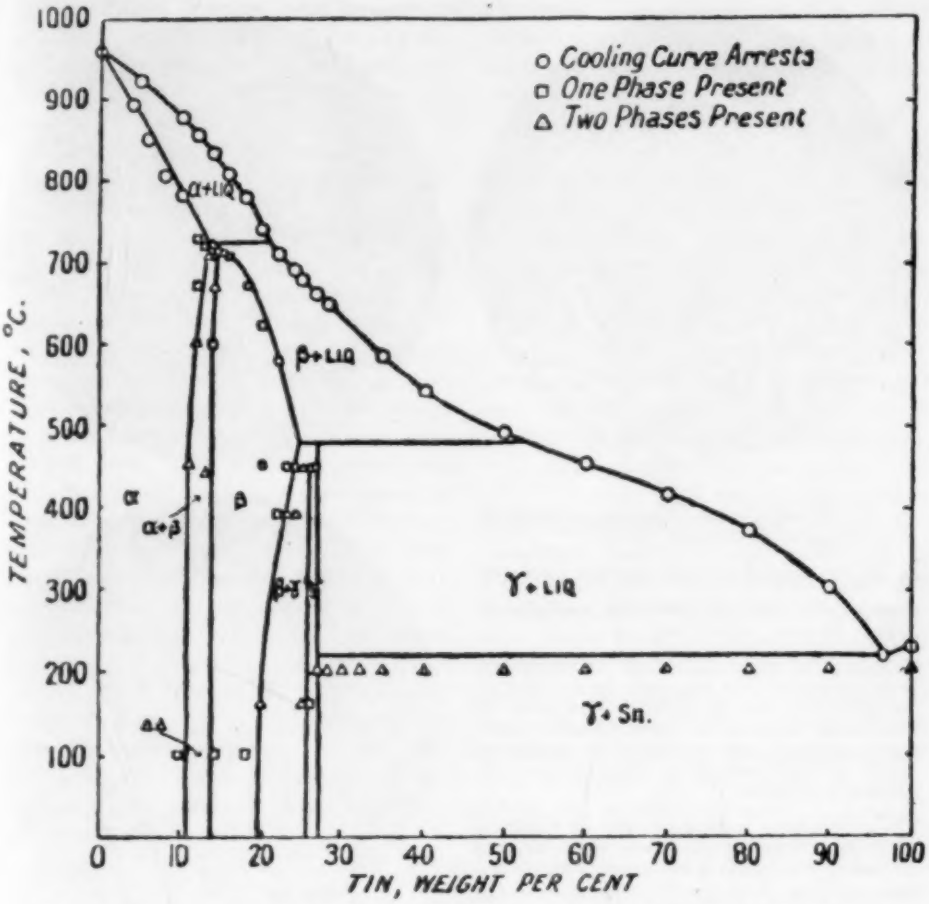

Fig. 1.—Phase diagram for the silver-tin system in amalgam alloys (from Murphy[1])

involving melting by gas, resistance heaters, atmospheric induction and vacuum induction had resulted in selection of the third method.)

To obtain the maximum gamma structure (Ag_3Sn), the system's phase changes were obtained from Murphy's equilibrium diagram. With them as a basis, a program of time-temperature relations was worked out for heat treating the as-cast alloy. At each step the alloy was studied metallographically for increase in the gamma constituent, and also was tested in accordance with American Dental Association Specification No. 1 (Amalgam Alloys). After some experience the microscopic work did not present much difficulty. The structure of the as-cast ingot is dendritic, and during heat treatment more and more of the dendrites disappeared to be replaced by the gamma constituent, which with practice is easily recognizable in this system.

As an example of the metallographic changes observed, three photomicrographs are shown (Fig. 2). Analysis of this melt was 69.19 per cent silver, 25.71 per cent tin, 4.35 per cent copper and 0.75 per cent zinc. This analysis is designated as "1" in the tables in this article.

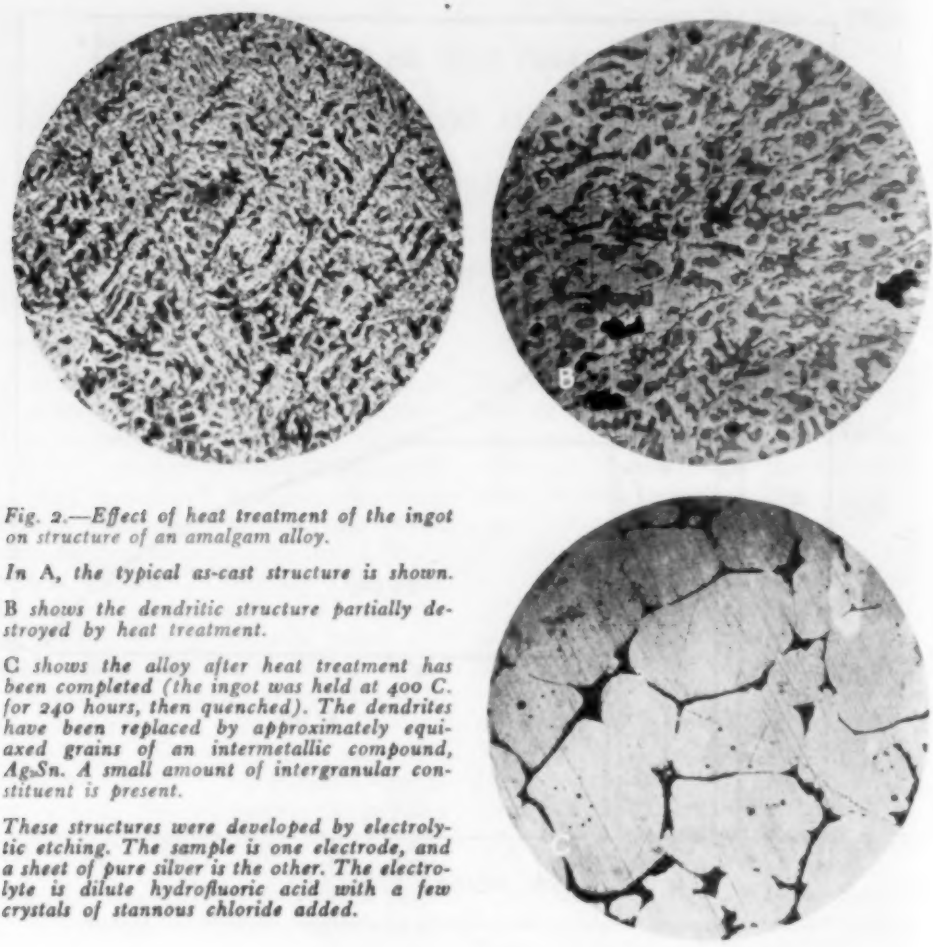

Fig. 2.—Effect of heat treatment of the ingot on structure of an amalgam alloy.

In A, *the typical as-cast structure is shown.*

B *shows the dendritic structure partially destroyed by heat treatment.*

C *shows the alloy after heat treatment has been completed (the ingot was held at 400 C. for 240 hours, then quenched). The dendrites have been replaced by approximately equiaxed grains of an intermetallic compound, Ag_3Sn. A small amount of intergranular constituent is present.*

These structures were developed by electrolytic etching. The sample is one electrode, and a sheet of pure silver is the other. The electrolyte is dilute hydrofluoric acid with a few crystals of stannous chloride added.

As a result of this heat-treating study, the group of samples shown in the photomicrographs seem to merit attention. Amalgamation behavior, physical properties and latitude of technic seem to approach the ideal, as will be shown later. From the purely theoretic angle, I am willing to commit myself to one explanation for the radical changes in behavior that developed, and tentatively advance a further explanation.

The one fact that has been definitely proved by metallographic means is the establishment of a homogeneous structure within the alloy. When metals solidify from the liquid state, crystallization or development of individual grains starts around a nucleus. Layer after layer forms around this nucleus until the grains so forming meet neighboring grains, when crystallization stops at that particular portion of the alloy. The nucleus which first forms contains the highest melting portion of the alloy, and succeeding layers toward the outside of the grain contain less of the high melting and more of the low melting components. This peculiarity of crystal or grain structure is responsible for some of the undesirable properties of alloys when used in the as-

cast condition. Various heat treatments which can relieve this condition and distribute or rearrange the internal structure of each grain so it is homogeneous are well established for certain systems. The photomicrographs offer conclusive evidence that homogeneity has been obtained in the analysis under study.

The other explanation, which has been previously mentioned as tentative only, has to do with grain boundaries, and any metallurgist approaches this subject with some trepidation. However, since amalgamation—at least in its initial stages—might conceivably be in part a reaction of grain boundaries, it should be considered here. It is generally recognized that in a grain boundary a compromise zone of orientation exists, and further, that reactions here proceed much more rapidly than in the grain itself. It is quite conceivable that the heat treatment to which these alloys have been subjected has modified the structure of the grain boundaries so that initial amalgamation proceeds more rapidly and may possibly establish equilibrium sooner than in alloys prepared for amalgamation from as-cast ingots. This thesis is, however, admittedly conjectural.

Physical Properties

In the alloys which showed the greatest development of the gamma constituent as a result of heat treatment, certain definite variations from the usual amalgam alloy were immediately apparent. Incidentally, all cuttings from heat-treated ingots were prepared by a standardized production procedure and given a low temperature anneal for strain release. All things being identical except high temperature heat treatment, this amalgam was much more fluid than amalgam from as-cast ingots. This would seem to indicate that the initial reaction was proceeding at least as rapidly and with less mercury, and that probably less residual mercury remained in the final amalgam. The advantages of a plastic initial mix in adaptation seem fairly well accepted, so this alloy agrees with current thought on that point.

Beyond this, there is a definite difference in the behavior of the material during packing. In placing an amalgam restoration, a somewhat more plastic base is first packed. With the ordinary alloy not subjected to high-temperature treatment, the plugger easily goes through this more plastic material and strikes the bottom of the cavity repeatedly until a sufficient depth has been built up to act as a cushion. However, in the case of the high-temperature heat-treated material, with a slight amount of mercury expressed to bring it back to the average plasticity initially used with conventional amalgams, more resistance is offered to the plugger. It very infrequently breaks through to the bottom of the cavity itself. Since both amalgams have been brought to the same plasticity before packing, the difference in resistance to the plugger is difficult to explain. It nevertheless exists, and has been checked by numerous "blindfold" tests. It is believed this greater resistance affords better adaptation to microscopic irregularities of the cavity wall. The resistance offered by the heat-treated material seems to transmit the packing pressure by a truly hydraulic means and therefore is responsible for the better adaptation which has been proved by testing for resistance to air leakage. While this test has known weaknesses, if carried out under standardized conditions it is probably the best available.

Another thing that the practitioner might notice about this heat-treated material is that it seems to have a slightly better resistance to tarnish. No standard tests are available for this purpose, but visual observation over periods up to almost two years seemed to verify it. The observations were made by two dentists, each of whom placed fillings of the heat-treated amalgam in eight mouths.

Table 1

Alloy 1 from ingot:	Mortar trituration,* seconds	Hand mulling, seconds	Flow, per cent	Resultant mix
Not heat treated	45	75	2.5	Normal
Not heat treated	45	None	8.5	Under
Heat treated	35	10	1.3	Under
Heat treated	45	None	1.1	Under
Heat treated	45	75	1.1	Normal
Heat treated	120	300	1.3	Over

*100 revolutions per minute; pestle pressure not more than 1 pound.

Amalgam fillings of other alloys were also present in almost all of the test patients, so that direct comparisons were possible. This study was discontinued at the beginning of the war.

The foregoing are the things that would be immediately apparent to a dental practitioner when using alloy cut from heat-treated ingots in contrast to non-heat-treated alloy. However, there are various factors that are of considerably more importance.

Probably the most important advantage offered by heat treatment is the much greater latitude of mixing technic possible while still retaining physical properties acceptable under Specification No. 1. This is illustrated by the data in Table 1.

All conditions in the preparation of these samples were identical except that the last four ingots were heat-treated and the first two were not. It is obvious that the wide variation in mixing technic had no effect on flow of amalgam from heat-treated ingots, which was not the case at all for untreated alloy 1. This behavior of the heat-treated alloy is more interesting when it is realized that the 45 second trituration gave an amalgam which was so dry no practitioner would consider using it.

When the same variations in mixing technic were employed in the preparation of samples for examination of linear changes, approximately the same relationship existed except that the very dry material triturated 45 seconds exceeded slightly the upper limit of 13 microns for expansion. However, as just mentioned, no one would consider using such an amalgam, because of its complete lack of plasticity.

From the foregoing, it is apparent that alloy cut from heat-treated ingots provides the practitioner considerable latitude of manipulation for desirable amalgam. This is of importance, as few practitioners prepare amalgam alloys by such rigid routine as is followed in the average testing laboratory.

Mercury Content

Another thing that is not apparent to the practitioner in connection with heat-treated alloy is that less residual mercury remains in the completed restoration. Decrease of residual mercury has a very beneficial effect on amalgam alloy, and this has been discussed at some length by Ward and his associates.[2-4] Lower mercury content from exactly comparable technics is more or less to be expected, as the homogeneity of the system developed by the heat treatment should tend to establish equilibrium more quickly. The lessened mercury content

2. Ward, M. L., and Scott, E. O., Effects of Variations in Manipulation on Dimensional Changes, Crushing Strength and Flow of Amalgams. *J.A.D.A.* 19:1683 (Oct.) 1932.

3. Ward, M. L., and Scott, E. O., Further Studies of the Effect of Variations in Manipulation on Dimensional Changes and Flow of Amalgams. *J.A.D.A.* 22: 1164 (July) 1935.

4. Ward, M. L.; Peyton, F. A., and Scott, E. O., New Concepts of Mercury Content in Amalgams. *J. D. Res.* 16:316 (Aug.) 1937.

Table 2

Alloy	Per cent of mercury
High packing pressure	
1—ingot heat treated	47.15
1—ingot not heat treated	49.00
Low packing pressure	
1—ingot heat treated	52.05
1—ingot not heat treated	53.50
2	53.80
3	54.20
4	53.85

Because of changes in characteristics of alloys 2, 3 and 4 since the start of this problem, it is deemed inadvisable to identify them by trade name.

does not throw the alloy out of compliance with specifications.

To illustrate this point, the results of a series of mercury analyses are given in Table 2. An adequate number of tests was run to insure accuracy. Data is given for alloy 1 in its non-heat-treated form and also in its experimental form (cut from a heat-treated ingot); both have the same chemical analysis. Alloys 2, 3 and 4 are other amalgam alloys now commercially available. "Low" and "high" packing pressures may be interpreted as 5 and 10 pound packing pressure with a 1.5 to 2.0 mm. plugger. A brief study of average pressures exerted by practitioners in this district revealed this variation.

It is interesting and also expected that the mercury content of the heat-treated material is lower in both series. As has been pointed out by Ward, lower mercury content without exception tends to create more desirable properties, and in some instances is the difference between an amalgam that complies with specifications and one that does not. It is believed that the variations in mercury content pointed out are sufficient in magnitude to indicate a definite advantage in heat-treated material, from the standpoint of obtaining restorations of the most desirable physical properties.

Distribution of Mercury

As a logical continuation of this mercury study, investigation was made to determine any variation in mercury content of amalgam restorations between top and bottom of test specimens when packed by accepted dental technic. Accordingly, with amalgams prepared by exactly the same technic, two different operators were asked to pack samples of alloy 1 from a heat-treated ingot and alloy 1 from a non-heat-treated ingot. As indicated in Table 3, some of these samples were divided into halves and others into thirds.

The variation in mercury between the top and bottom of an amalgam alloy was shown to be alarming. If an engineer were asked to build a structure, using as a unit of this structure any member which showed as great variation in any component as is shown by variations in mercury in this system, he would rightfully refuse to be responsible for its success. It would seem that some thought could well be given by the dental profession, and by those responsible for its instruction, to the development of a technic which would obviate such variations. A restoration should have a better chance of success if the present practice of using a more fluid bottom consistency and a "dry" top consistency were discontinued, and in its place a procedure adopted in which the consistency of the amalgam being packed is uniform throughout.

As is to be expected, alloy 1 from a heat-treated ingot showed a similar variation in mercury content. Fortunately the variation was of lower degree and consequently internal stresses set up would be less than in the case of many alloys available commercially today.

Actually the mercury content of amalgam from the heat-treated alloy 1 usually is about equivalent in amount to that which would result if a pressure of approximately 20 pounds were used with a 2 mm. plugger on a conventional type

alloy. Since this high pressure is almost impossible to achieve in the human mouth, the potentialities of such an alloy in dental practice can be seen.

In an attempt to measure the differential of residual energy in an amalgam filling prepared by current dental technic, samples of non-heat-treated alloy 1 were packed by two dentists, the whole of each sample being packed as if it were the bottom of a filling or the top of a filling.

The amalgam that was packed as for the bottom of a cavity showed a linear expansion of 19 microns during the first 24 hours and a flow of 7 per cent, whereas the sample packed as for the top of a cavity showed a linear expansion of only 6 microns and a flow of 2.4 per cent. Thus, while the top of a filling is attempting to expand at the rate of 6 microns during the first 24 hours, the bottom of a filling is attempting to expand slightly more than three times as much. This may be one explanation of the postoperative pain from amalgam restorations mentioned by Romnes and Skinner.[5] Obviously, a linear change of 19 microns would cause more disturbance to surrounding tooth structure than one of only 6 microns.

This difference in behavior between the top and bottom portion of amalgam specimens is really rather disturbing to consider, and plans are being made to study it further from the standpoint of its correction by metallurgic means. However, it does seem that an immediate remedy could be effected by variation of technic of insertion to keep mercury content constant throughout the restoration. Packing amalgam of the same plasticity from the bottom to the top of the restoration should minimize or eliminate unequal expansion and flow previously cited.

A study is now being instituted to determine any tendency of the amalgam to establish equilibrium over periods of time. However, this will require a rather extended interval, so it is only mentioned here.

Table 3.—Percentage of mercury in various portions of amalgam samples prepared from alloy 1 and packed by accepted dental technic

	Percentage of mercury		
	ingot not heat treated		ingot heat treated
	Operator A	Operator B	Operator B
Sample 1			
Top half	49.4	48.6	45.8
Bottom half	50.5	50.2	47.0
Sample 2			
Top third	48.5	47.4	—
Middle third	49.95	48.8	—
Bottom third	51.2	49.9	—

Summary

The application of well known principles of physical metallurgy to the amalgam alloy system has been described. Results seem to be beneficial in the extreme, as better physical properties, more latitude of mixing technic and better packing properties have resulted. Structural equilibrium has been established, a condition which has not been found to exist currently in the several alloys for dental amalgams that were tested.

Variations in mercury content between top and bottom of amalgam alloy restorations have been pointed out, and dangerous internal stresses resulting therefrom are described. This is particularly pertinent, as mention has been made in the literature of postoperative pain after such restorations. This heat-treated formula seems to be at least a portion of the answer to the problem, as through its lower mercury content the differential in its internal stress is lower than that in non-heat-treated alloys, and less postoperative disturbances should result.

DECIMAL OUTLINE FOR CLASSIFICATION OF PRACTICE MANAGEMENT MATERIAL

Robert L. Borland, D.D.S., Los Angeles

EACH dental practice has numerous facets and each facet, properly handled, is an important factor in building and maintaining the practice. In order to establish and develop a successful practice, the knowledge that has been acquired on practice management should be recorded in a systematic manner.

Through the use of the decimal system it is possible to transfer single paragraphs or whole essays to a card index, thereby making information on each phase of practice management easily available. Approximately one hundred phases of practice management have been listed in this decimal classification. Practice building and practice deterioration also appear. The first ten decimals and the last ten decimals cover broad areas, and generalized topics can be placed in these categories.

.00 GENERAL REFERENCE
.01 Theories
.02 Philosophy
.03 Logic
.04 Ethics
.05 Definitions
.06 Discretion
.07 Judgment
.08 Efficiency
.09 Standards

.10 THE PRACTICE
.11 Practice Building
.12 Making Friends
.13 Loyalty and Sincerity
.14 Creating Confidence
.15 Art of Conversation
.16 Adaptability (from patient's point of view)
.17 Professional Business Principles
.18 Quality of the Product
.19 Cleanliness of Mind and Body

.20 PSYCHOLOGY
.21 Creating Desire for the Best
.22 Mental Suggestion
.23 Practice Psychology
.24 Dispelling Fears
.25 Professional Tact and Courage
.26 Ethical Salesmanship
.27 Promotion of Health
.28 Child Psychology
.29 Self Analysis

.30 SOCIAL AND CIVIC CONTACTS
.31 Practice Extension
.32 Cultural Reading and Relations
.33 Home Entertaining
.34 Clubs and Hostship
.35 Posture—Athletics—Hobbies
.36 Rest—Health—Vacations
.37 Civic Responsibilities
.38 Civic Projects
.39 Toastmasters and Speaking

.40 LOCATION
.41 Patients' Convenience
.42 Patients' Transportation
.43 Extra-Dental Conveniences
.44 Office Equipment
.45 Office Maintenance
.46 Office Architecture
.47 Office Floor Plans
.48 Office Interior Decorating
.49 Location Deterioration

Read at the eighty-eighth session of the American Dental Association, Section on Practice Management, Boston, August 5, 1947.

.50 INCOME
.51 Time Charts
.52 Overhead Costs
.53 Financial Profits
.54 Reserves and Inventories
.55 Insurance and Investments
.56 Credit Ratings
.57 Bookkeeping
.58 Tax Records
.59 Patients' Record Forms

.60 CHAIR ROUTINE
.61 Ability—Finger Dexterity
.62 Precharting and Study Models
.63 Gentle Operator vs. Speed
.64 Sedatives and Anesthetics
.65 Thermal Pain
.66 Chair Conversation
.67 Postoperative Attention
.68 Recall Charts
.69 Appointment Book Timing

.70 ASSOCIATES
.71 Dental Nurse
.72 Nurse's Qualifications
.73 Nurse's Duties
.74 Nurse's Future
.75 Secretary-Receptionist
.76 Auditor
.77 Dental Laboratory Technician
.78 Dental Hygienist
.79 Associate Dentist

.80 DENTAL ORGANIZATIONS
.81 Your Alma Mater
.82 Local Dental Society
.83 Dental Association Meetings
.84 Private and Loan Libraries
.85 Study Clubs
.86 Dental Journals
.87 Presentation of Clinics and Papers
.88 Graduate Study Courses
.89 Dental Supply House

.90 SPECIALTIES
.91 Diagnosis and Pathology
.92 Operative Dentistry
.93 Exodontia—Oral Surgery
.94 Prosthetics
.95 Crown and Bridge Prosthesis
.96 Periodontia
.97 Dentistry for Children
.98 Orthodontics
.99 Shall I Limit My Practice?

This decimal outline is subject to expansion or contraction as necessary. I hope it will be a practical help in developing a finer and more satisfactory type of dental service for the people of this country.—*756 South Broadway.*

▲

Schools, not Socialism.—To me, welfare of the medical profession as such is of no concern; the medics can, and no doubt will, look after themselves as free Americans.

But the principle is something else again. The principle of socialized medicine is just one more step—a tremendous step—away from American free enterprise, American initiative of profession and enterprise. It's just another step into foils of state socialism that sooner or later becomes nothing more nor less than fascism.

If the white knights want to do something worth while about public health and medical services, let them initiate a program for creation of more medical-school facilities. It's about as hard for a candidate to get into a medical school today as it is for a recruit to get into West Point.

If the "people" want to change something let them work on a change in that situation—but let's leave basic American principles alone, because they're the principles that made this the healthiest, happiest, and most prosperous nation in the world today.—*Fred C. Koch, editor, in The Journal (East Wenatchee, Wash.), Dec. 16, 1948.*

SOME OBSERVATIONS ON THE USE OF THE TERM PROGNATHISM

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THE late T. Wingate Todd,[1] anatomist and physical anthropologist, once said before a meeting of dentists: " 'Prognathism' is a harmless word, which, by its very simplicity, lends itself to a variety of interpretations." One suspects that he spoke with his tongue in his cheek and a tolerant twinkle in his eye, for in his own scientific work he strove to avoid ambiguity and tried to evaluate biologic phenomena by precise standards, some of which he helped to establish.

It cannot be maintained seriously, however, that prognathism is a harmless word. It is a technical term that has come to be employed in describing the protrusive character of several of the facial structures in pathologic arrangement, while in its original and still accepted meaning it is applied to normal protrusiveness of the face as a whole. As a scientific word it is of value in transmitting a specific concept so long as it is rigidly defined. It loses its value as an instrument of science when it is redefined by individual writers, many of whom are not in agreement, to suit their respective needs.

All words are merely symbols of concepts and are of primary service in transmitting concepts from one mind to another. The accurate transmission of concepts is of great importance if the objectives of science are to be achieved. If such transmission is possible through use of a given word, that word has scientific value, but if a symbol, such as prognathism, causes different concepts to be formed in various minds, the symbol does not serve the purpose for which it was created and becomes a hazard to the dissemination of knowledge. After the obstructive nature of a symbol becomes well recognized, it is usually removed from scientific vocabularies.

Dampier[2] defined science as "ordered knowledge of natural phenomena and the rational study of the relations between those concepts in which these phenomena are expressed." In the light of this definition it is obvious that a word capable of expressing several concepts is ill adapted to the study of the relations between them, because of the uncertainty of exactly which concepts are involved. This uncertainty gives rise to disordered knowledge, which is quite the opposite of science. It is precisely this situation that exists with regard to the term prognathism, references to which have appeared in the dental and medical literature of the last seventy years.

Present Usages of the Term

The numerous meanings attached to the word have resulted in considerable confusion (Fig. 1). The confusion is serious, even though the specific subject is limited, for it has bred misunderstanding of some of the vital structural and developmental phenomena of the face.

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1. Todd, T. W., Prognathism: A Study in Development of the Face. *J.A.D.A.* 19:2172 (Dec.) 1932.

2. Dampier, W. C., *A History of Science*, ed. 3. New York: The Macmillan Company, 1943, p. xiii.

It has obscured the distinction between normal morphologic variations and true pathologic characteristics.

The following random selections which demonstrate the confusion about prognathism are not necessarily from authors who are confused about their own concepts, but they illustrate the differing meanings that prognathism has for different men. It is true that some of the selections show a confusion of which the authors, apparently, were not aware. This, of course, adds to the general confusion, especially when the authors write authoritatively.

The general anthropologic concept of prognathism was stated by Stibbe[3] as follows:

> In man the face is not only relatively small but does not project in front of the cranium. Thus in profile the line of the face is approximately at right angles to the cranium. Or this might be expressed by saying that the face lies under the front part of the cranium. Such a skull is called orthognathous in contrast with the prognathous skull in which the jaws project in front of the cranium. Human skulls are orthognathous or very slightly prognathous.

A more precise expression of the same point of view is taken from a textbook of anatomy:[4]

> The degree of facial prominence is indicated by the facial angle, made with the Frankfort horizontal plane . . . by a line from nasion to prosthion. When the angle is below 80° the skull is prognathous; above 85° orthognathous; between 80° and 85° mesognathous.

Another standard textbook of anatomy contains this:[5]

> Prognathism denotes the forward projection of the face. This was formerly expressed by what is known as Camper's facial angle, which was measured on the arc between two lines meeting at the nasal spine, one starting from the auricular point, the other from the most prominent part of the forehead in the middle line. . . . This has fallen into disuse owing to inherent defects, and perhaps in part to discordant directions given for drawing the lines. Flower's gnathic index is the ratio of the line from the basion to the alveolar point to the line from the basion to the nasion.
>
> $$\frac{100 \times \text{basi-alveolar line}}{\text{basi-nasal line}}$$
>
> A skull is orthognathous with an index below 98; mesognathous with one from 98 to 103; prognathous with one above 103. [Fig. 2.]

It will be observed that the foregoing views of anthropology and anatomy are very much in accord. It will be shown later that these views coincide with the original concept of prognathism.

3. Stibbe, E. P., *An Introduction to Physical Anthropology*. London: Edward Arnold & Co., 1930, p. 36.

4. Schaeffer, J. P. (edited by), *Morris' Human Anatomy*, ed. 10. Philadelphia: The Blakiston Company, 1942, p. 174.

5. Huber, G. C. (edited by), *Piersol's Human Anatomy*, ed. 9. Philadelphia: J. B. Lippincott Company, 1936, p. 229.

Fig. 1.—Facial profiles typifying three different concepts of prognathism.

A now obsolete medical dictionary[6] gives this definition:

> Prognathous. Having the jaws projecting forward; having the gnathic index above 103° (Flower), or the profile angle below 89°, or Camper's facial angle below 80°.

An inaccuracy of conception is herein apparent, since the gnathic index is a statement of a ratio rather than an angular measurement and hence should not be stated in degrees.

A not so obsolete medical dictionary[7] defines prognathism as:

> The condition of being prognathic; abnormal projection forward of one or both jaws.

This point of view is opposed to the anthropologic conception of prognathism as a normal trait.

A recent edition of another medical dictionary,[8] however, is not in agreement with the above quotation, for it defines prognathism as "having projecting jaws, or being prognathous," and then continues to define alveolo-subnasal prognathism in accordance with anatomic and anthropologic usage.

Still another medical dictionary[9] published the same year states that prognathism is "the condition of being prognathous; marked projection of the jaw; having a gnathic index above 103." This definition is ambiguous. Is it the upper or the lower jaw to which reference is made? It might be argued that this point is clarified by reference to the gnathic index. However, it will be shown that all who refer to the gnathic index are not necessarily familiar with it.

One dental dictionary,[10] while not conforming to the original usage of prognathism, is unambiguous in defining it as "pronounced projection of the lower jaw."

Consider the definitions contained in another dental dictionary:[11]

> Prognathism. Abnormal protrusion of the mandible.
>
> Prognathic, prognathous. Possessing a protruding mandible, *i.e.*, one having a gnathic index of more than 103.

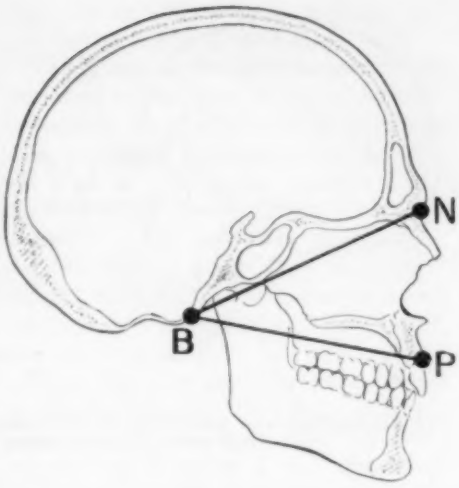

Fig. 2.—Lines of measurement by which the gnathic index is established. In prognathous skulls, line B-P is longer in relation to line B-N than is the case in mesognathous and orthognathous skulls. Hence, the numerical value of the gnathic index is greater in prognathous skulls than in the other two types

Not only is this quotation confusing, but it also is evidence of confused thinking. It is true that prognathism, in the anthropologic sense, may be demonstrated by the gnathic index, which is derived from measurements between craniometric points situated on the midline of the skull at the frontonasal suture (nasion), at the maxillary alveolar border (prosthion) and at the anterior border of the foramen magnum (basion) (Fig. 3). But when prognathism acquires a new meaning such as "a protruding

6. Foster, F. P., *An Illustrated Encyclopaedic Medical Dictionary*. New York: D. Appleton and Company, 1894, vol. 4, p. 2647.

7. Stedman, T. L., *A Practical Medical Dictionary*, ed. 5. Baltimore: The Williams & Wilkins Company, 1918.

8. Brownlow, C. V. (edited by), *Gould's Medical Dictionary*, ed. 5. Philadelphia: The Blakiston Company, 1941.

9. Dorland, W. A. N., *The American Illustrated Medical Dictionary*, ed. 19. Philadelphia: W. B. Saunders Company, 1941.

10. Anthony, L. P., *A Dictionary of Dental Science*. Philadelphia: Lea & Febiger, 1922.

11. Dunning, W. B., and Davenport, S. E., *A Dictionary of Dental Science and Art*. Philadelphia: P. Blakiston's Son & Co., Inc., 1936.

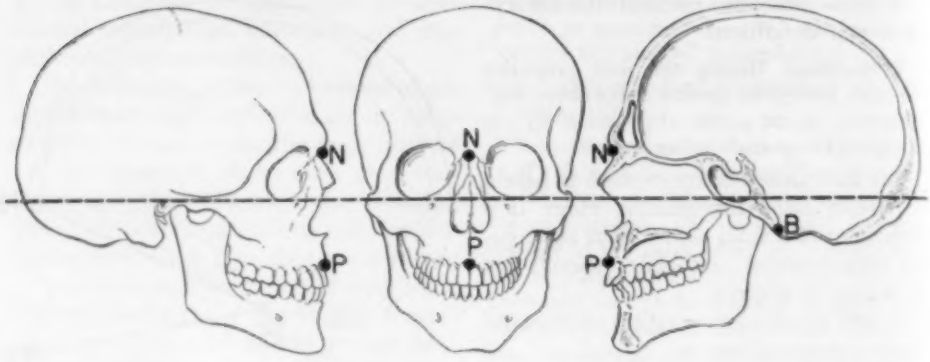

Fig. 3.—Craniometric points used in measuring prognathism: P, prosthion; N, nasion; B, basion. Skull oriented on Frankfort horizontal plane (broken line)

mandible," the gnathic index will no longer serve to evaluate it.

This diversity of opinion is not confined to dictionaries. For example, a widely read orthodontic textbook[12] says:

> In Type III the maxillary arch is considerably under-developed, with the mandibular arch overdeveloped. . . . Facial deformity in the nature of a prognathism is pronounced, more so in this type than in the first two types.

Here again is encountered the concept that prognathism is a pathologic condition. On page 116 of the same book is this statement:

> The projection of the teeth and of the lower part of the face is also influenced by racial characteristics, and the extent of that protrusion can be studied by the gnathic index. The three distinct variations of facial protrusion or projection of the teeth are represented in the terms prognathic, mesionathic and orthonathic, varying in turn according to the degree of slant, or inclination, of the teeth and of the lower part of the face.

At least implied in these statements are three concepts of prognathism: (1) that it is a pathologic condition in which the mandible is overdeveloped; (2) that it is a normal racial characteristic which can be evaluated by the gnathic index and (3) that the inclinations of the teeth are fundamental considerations in determining the gnathic index by which prognathism is evaluated. Concept 2 conforms to anthropologic and anatomic usage, but concept 1 is quite opposed to it; concept 3 is erroneous since the only anatomic landmarks utilized in determining the gnathic index are basion, nasion and prosthion. Because of this confusion of concepts it would seem, in this instance, that the ideas of prognathism are not clear, and the impression is intensified by use of the words "mesionathic" and "orthonathic."

However, the orthodontic viewpoint on this subject is not uniform. Mayoral[13] said:

> When the jaws deviate forward, we have prognathism; . . . The chin, quite independently of the position of the jaw may deviate forward—progenesism.

Lundstrom[14] said:

> Strictly speaking progenie means a condition in which the chin is abnormally far forward in relation to the rest of the face. . . . It

12. Dewey, Martin, and Anderson, G. M., *Practical Orthodontics*, ed. 6. St. Louis: C. V. Mosby Company, 1942, p. 106.

13. Mayoral, José, On the Classification of Dentofacial Anomalies. *Am. J. Orthodont. & Oral Surg.* 31:429 (Sept.) 1945.

14. Lundström, A. F., Malocclusion of the Teeth Regarded as a Problem in Connection With the Apical Base. *Inter. J. Orthodont., Oral Surg. & Radiog.* 11:793 (Sept.) 1925.

is an old established custom in dental literature to use the term for a lower arch projecting too far forward. . . . Progenie is in its nature radically different from the prognathism which may characterize the upper front teeth.

Oppenheim,[15] aware of the anthropologic usage, avoided misunderstanding when describing a specific abnormality by referring to "pathological 'prognathism,' the Class II, Division 1 of Angle."

Jackson,[16] in discussing an orthodontic problem said:

When the same intermaxillary force is continued too long changing the angle and causing the ramus to become too obtuse, it is an objectionable feature, this having brought about prognathism and final lack of incisal occlusion of the teeth. This prognathous condition would, if necessary, be corrected by reversing the action of the intermaxillary force, and in cases of *true prognathism*, in addition to this intermaxillary force described, force by a chin cap with cranial cap should be applied, correcting the angle of the mandible and causing it to return to more near a right angle.

The implications that prognathism may be evaluated by reference to the mandibular angle and that one may distinguish between true and false prognathism are complicating concepts.

It is scarcely necessary to call attention to the large number of similar papers dealing with the familiar "surgical correction of prognathism," which have appeared in recent years in the literature of oral surgery. Most of the authors of these papers refer to any abnormal enlargement or protrusion of the mandible, regardless of cause, as prognathism. Occasionally an author objects to the inclusiveness of the term and prefers a more exclusive employment. In an abstract of an article by Dufourmontel[17] is this statement:

The author does not refer to true prognathism but to an acquired condition, a thrusting forward of the mandible in an old unreduced and irreducible dislocation.

This is another instance of distinction between true and false prognathism, but these are not the same as the true and false prognathism of Jackson.

The *Index to Dental Literature*[18] was consulted in the effort to compile a comprehensive list of references which might yield additional information on the various uses of the word "prognathism." Unfortunately, the *Index* deals with this subject only as an abnormality for which treatment might be considered appropriate and disregards the other usages which are equally applicable to bibliographic research in dentistry.

From the examples quoted it should be abundantly clear that there is ample opportunity for misunderstanding when prognathism is involved in a discussion. Men have used the same term and have often failed to arrive at the same conclusion because each was considering a different entity which bore the name of prognathism.

In commenting on this matter, Oppenheim[15] says:

Since recent investigations have transformed anthropology and dentistry into kindred sciences, it is surely unfortunate that each respectively uses one and the same term for two intrinsically different concepts, a procedure which certainly leads to misunderstanding.

Original Usage

A question which arises quite naturally at this point is which usage of prognathism is the correct one. This question is not easily answered because it is usage itself which frequently determines what is or is not correct. At this stage the problem consists of ascertaining the usage of prognathism which will best serve the interests of science as a whole, for it is

15. Oppenheim, A., Prognathism From the Anthropological and Orthodontic Viewpoints. *D. Cosmos* 70: 1092 (Nov.) 1928.

16. Jackson, V. H., in discussion of his article, A Consideration of Bite-Planes in Orthodontia. *Inter. J. Orthodont. & Oral Surg.* 8:19 (Jan.) 1922.

17. Dufourmontel, L., Surgical Treatment of Prognathism. (Abstract) *Inter. J. Orthodont. & Oral Surg.* 7:566 (Oct.) 1921.

18. *Index to Dental Literature, 1942-1944.* Chicago: American Dental Association, 1946.

from science that our modern professions draw their vitalizing forces. Consideration must be given to the development of the varying usages, their chronologic origin, consistency of use and accuracy of definition, before attempting to settle upon the one most clearly entitled to perpetuation.

One of the earliest methods for evaluating the degree of protrusiveness of the face was described in a paper written by Camper[19] in 1786 and published posthumously. While Camper did not use the word prognathism he had a concept of it and portrayed it graphically. He said:

> The Angle which the facial or characteristic line of the face makes varies from 70 to 80 degrees in the human species. All above is resolved by the rules of art, all below bears resemblance to that of the apes. If I make the facial line lean forward, I have an antique head; if backward, the head of a negro. If I still more incline it, I have the head of an ape; and if more still, that of a dog, and then that of an idiot.

Camper's facial angle is created by the intersection of two planes, one passing through the external auditory meatus and the anterior nasal spine, the other tangent to the forehead and the face.

Camper's idea of the facial angle was well founded in a general way, but it was too vague to be well suited for precise scientific use. Consequently the ensuing years brought numerous modifications designed to provide greater precision in observation.

Late in the eighteenth century the angle of Geoffroy Saint Hillaire, the naturalist, and Cuvier, the comparative anatomist, was offered as an improvement on Camper's method. The angle was measured between two planes, one passing tangent to the forehead and through the incisal edges of the upper central incisors, the other passing through the external auditory meatus and the incisal edges of the upper central incisors. This method offered the advantage of somewhat more specific reference points, but since it really represented only a stage along the way toward more exact observational procedures it was later superseded. The fundamental reference point was the incisal edges of the upper central incisor, a point that is inherently unreliable for craniometric purposes. Attrition of the teeth, pathologic alterations of the periodontium and loss of the upper incisors produce changes in angular measurement which are in no way a reflection of the fundamental characteristics of the face itself.

In 1821 Cloquet proposed that the facial angle be measured on a slightly different basis. The vertex of the angle was at prosthion, the antero-inferior point of the maxillary alveolar process at the intermaxillary suture. The angle was formed by the intersection of two planes, one tangent to the forehead and passing through prosthion, the other passing through the external auditory meatus and prosthion. Cloquet's angle thus avoided a defect prominent in the angle of Saint Hillaire and Cuvier.

A few years later, the word prognathism began to be used with increasing frequency to describe the facial characteristics expressed by the more acute measurements of the facial angle. Prichard[20] seems to have been most responsible for its entrenchment in the anthropologic vocabulary. In writing of the physical peculiarities of the various groups of mankind he said:

> The third, or prognathous, corresponds to the negro type. . . . The cheek bones project rather forwards than outwards (prognathism).

It must be remembered, however, that for many years afterward craniometric procedures were still mainly on an individual basis, and concepts of prognathism were not precisely standardized.

19. Camper, Pierre, *Dissertation sur les Différences Réeles que Présentent les Traits du Visage Chez les Hommes de Différents Pays et de Différents Ages.* 1791.

20. Prichard, J. C., *Researches Into the Physical History of Mankind.* (5 vols.) 1836-1847.

Opinion differed on what parts of the face were most responsible for its prognathous character. Almost half a century later Topinard,[21] the famous French anthropologist, complained:

> Prognathism has always since the time of Prichard been understood to mean the elongation and prominence, or obliquity, of the jaws, common in the black races of Africa and Oceania, accidental in some Europeans. It is in the profile that we at once recognize it, whether in the living subject or on the skull. An imaginary perpendicular is let fall from the root or anterior spine of the nose, and according as the portion in front is more or less considerable, so we say the subject is, or is not, prognathous. Nothing is more simple, and yet we meet with the term among authors in various acceptations.

Topinard was referring to what is now known more precisely as alveolo-subnasal prognathism.

It is interesting to note that up to the time of Prichard's works, and for many years thereafter, prognathism did not appear in the dental literature except in accepted anthropologic usage, and then only after it had been well established in anthropologic terminology. Harris,[22] in writing of the protruding lower jaw in 1839 said:

> The under front teeth sometimes shut in this manner even when there is no deviation of the upper to the interior. Here the irregularity is owing to a preternatural elongation of the lower jaw, which more frequently results from some fault in the dentition of the second denture than from any defect congenital with the jaw itself.

Nowhere in his work does he refer to this abnormality as prognathism.

In 1841 Gunnell[23] said:

> About the year 1822 or 1823 my attention was called to the necessity of some plan, whereby the protrusion of the lower jaw (called jimber jaw or morose jaw) should be restored to its proper situation. . . .

If he had been familiar with the word as a synonym for mandibular protrusion one might expect to find prognathism listed with "jimber jaw" or "morose jaw," but its absence suggests that such usage was not then current.

Tomes[24] wrote in 1847:

> In some cases, however, from malposition of the teeth, or from want of a proper ratio in growth of the upper and lower jaw, the upper teeth close posterior to those of the lower jaw —a condition commonly denominated "underhung."

Tomes did not refer to prognathism.

In 1849 Hullihen[25] published a paper dealing with the treatment of "elongation of the under jaw and distortion of the face and neck, caused by a burn," in which he described his surgical procedures for correction of the defects. This paper contains the first report of a mandibular resection designed to correct an abnormal protrusion of the mandible. If Hullihen had published his paper in our time it is very possible that he would have termed his procedure "a surgical correction of prognathism," but, apparently, a century ago this usage was not in vogue.

In his treatise on the dental structures, published in 1854, Goddard[26] described two features of the face and jaws, each of which might have been termed prognathism according to present custom. He said:

> The most common deviation affecting the whole mouth is the projection of the lower jaw over the upper, so as to produce a false close as it is called. . . . Now when this deformity exists, the relative size of the teeth is not altered, consequently the lower jaw becomes deformed, is elongated and its angle rendered very obtuse.

21. Topinard, Paul, *Anthropology*. Translated from the French, new edition. London: Chapman and Hall, 1890, p. 277.

22. Harris, C. A., *The Dental Art, A Practical Treatise on Dental Surgery*. Baltimore: Armstrong & Berry, 1839, p. 100.

23. Gunnell, J. S., A Remedy for the Protrusion of the Lower Jaw. *Am. J. D. Sci.* (first series) 3:65, 1842-1843.

24. Tomes, John, *Dental Physiology and Surgery*. London, 1847.

25. Hullihen, S. P., Case of Elongation of the Under Jaw and Distortion of the Face and Neck, Caused by a Burn, Successfully Treated. *Am. J. D. Sci.* (first series) 9:157, 1849.

26. Goddard, P. B., *The Anatomy, Physiology and Pathology of the Human Teeth*. Philadelphia: Samuel S. and William Wood, 1854, p. 119.

A bit further along one reads:

> A form of deviation which can hardly be called irregularity exists occasionally, being most frequently found in the negro, which consists in a projection of the whole set of anterior teeth in the upper jaw . . . even at an angle of forty-five degrees with the perpendicular when the individual is erect.

Although Goddard's evaluation of the latter example is not quite accurate, he did distinguish between abnormal and normal peculiarities. It is curiously suggestive that he used the terms prognathism for neither of these conditions.

In 1856 Jacquart[27] introduced a new method for determining the facial angle. According to his method the vertex of the angle was at the anterior nasal spine and was formed by the intersection of two planes, one passing through the external auditory meatus and the anterior nasal spine, and the other tangent to the forehead and passing through the anterior nasal spine. Jacquart's method disregarded the alveolar component of total facial prognathism and consequently was not suitable for evaluating the general protrusiveness of the face as a unit. While it restricted specific observation to the upper part of the face, it is illustrative of continuing attempts by anthropologists at more precise methods for evaluating prognathism.

In 1859, at a meeting of the Pennsylvania Association of Dental Surgeons, there was a discussion of "The Causes and Treatment of Irregularity." In a report of this meeting[28] one sees ". . . the inferior maxilla preternaturally large, with the lower teeth striking outside of the upper . . ." and ". . . the peculiar deformity called limber jaw or underhung, with all of the lower front teeth striking outside of the upper . . ." and ". . . (the protrusion of the lower jaw) . . .," but nowhere in it does one see the word prognathism. The men who participated in this discussion were among the leaders of American dentistry of that day, and if prognathism was at that time used to describe a dental irregularity it would indeed be strange that none of them saw fit to employ it in discussing dental irregularities. The fact that it was not used strongly suggests that the word had not yet been incorporated in dental terminology.

In 1863 Flagg[29] spoke of "the protrusion of the inferior maxilla and consequently malocclusion of the teeth," but still he did not mention prognathism.

In the following year, Cartwright[30] in England wrote:

> There are two forms of irregularity of the lower jaw in which the circle of the teeth is larger than in the upper jaw, but in the one form the irregularity is dependent on the front teeth; in the other it arises from congenital abnormal size of the whole of the inferior maxilla, though both present what is termed underhung jaws.

Early Divergent Uses of the Term

Apparently prognathism was confined to anthropologic literature in England also at this time.

It is important to observe a generality at this point which may bear directly on the later aberrant uses of prognathism. The American dental literature of the middle third of the nineteenth century, as it related to orthodontic subjects, was characteristically practical. It showed but slight concern for the supposed academic problems of classification, specialized terminology and etiologic factors. In Europe, on the other hand, where academic pursuits were well established in the cultural fabric of at least a portion of the population, these problems were often treated in extreme detail. Since

27. Jacquart, H., *Mensuration de l'Angle Facial et Gonionetres.* 1856.

28. Barker, G. T., report of proceedings of the Pennsylvania Association of Dental Surgeons. *D. Cosmos* 1:179 (Nov.) 1859.

29. Flagg, J. F., Orthodontia, in report of proceedings of the Odontographic Society of Pennsylvania. *D. Cosmos* 5:17 (Aug.) 1863.

30. Cartwright, M. S., Reflections on the Cause and Treatment of Some Forms of Irregularity. *Tr. Odont. Soc.* (Great Britain). 1864, p. 114.

the beginning of the nineteenth century a considerable number of classifications of dental irregularities had been proposed, many of them utilizing terminologies that were as original as the systems in which they were employed. Because craniometric methods were being most seriously studied in Europe, it was quite natural that European dental and medical men should turn to the facilities of craniometry for means of observing, classifying and expressing the detailed abnormalities of dento-facial structures. Included in the craniometric facilities was the terminology. The facilities of anthropology were used directly where it was possible to do so; frequently they were adapted to medical and dental use, and occasionally they were considerably modified in adaptation. Prognathism as a term and as a concept did not escape this treatment.

An example of this adaptive procedure is found in a work by Magitot,[31] published in 1877. In his "Synoptic Table of Anomalies of the Dental Systems in Mammals" he lists "prognathisme accidentel" as a group under "anomalies of direction" of the teeth.

That this adaptive procedure was intentionally and intelligently (though perhaps ill-advisedly) followed is demonstrated in a work by Coles,[32] of England, in 1881. He said:

> The term prognathous is applied in anthropology to those skulls in which the projection of the upper jaw is excessive, and is accepted as a race-characteristic. . . . M. Topinard recognizes as true prognathism that which he calls alveolo-subnasal, limiting its area "to the portion of the maxilla subjacent to the nasal spine, which corresponds to the palatine arch, and that next to it in which the alveoli are situated." Applying the term to the purposes of a pathological classification, I have deemed it wise to limit still more the area to which it shall refer; hence the prefix, intermaxillary prognathism.

Coles[33] had used this term earlier, for it appears in his article entitled "Deformities of the Upper Jaw; An Attempted Classification of Them."

It is improbable that the works previously cited contain the only examples of this adaptive trend, and in tracing the evolution of the usages of prognathism additional references bearing on this point would be extremely valuable. But from the evidence which has been presented it does seem that this trend was of European origin. From what follows it would also seem that the adapted usage diffused into the American literature and that in the process a misconception was developed.

In 1878 the fourth edition of *A Dictionary of Medical Terminology, Dental Surgery and the Collateral Sciences,* by Harris,[34] was published after having been revised by F. J. S. Gorgas. In it this definition appears:

> Prognathous. Having a projecting jaw, as in the case where the teeth of the inferior maxillary shut in front of those of the superior.

The concept conveyed by this definition is not too clear since "a projecting jaw" could refer to either the upper or the lower jaw. Then, too, "as in the case where the teeth of the inferior maxillary shut in front of those of the superior" could have been submitted as one of several possible protrusive abnormalities of the dento-facial structures. The previous definition is highly interesting and possibly of great significance in the development of concepts of prognathism. Prior to its publication, prognathism conveyed the anthropologic concept in American dental literature, and a decade later confusion of its mean-

31. Magitot, Emile, Traite des Anomalies du Systeme Dentaire Chez l'Homme et les Mammiferes. Paris, 1877.

32. Coles, Oakley, *Deformities of the Mouth,* ed. 3. Philadelphia: Presley Blakiston, 1881, p. 76.

33. Coles, Oakley, Deformities of the Upper Jaw: An Attempted Classification of Them. *Tr. Odont. Soc.* (Great Britain). 1880, p. 103.

34. Harris, C. A., *A Dictionary of Medical Terminology, Dental Surgery and the Collateral Sciences,* ed. 4 (revised by F. J. S. Gorgas). Philadelphia: Lindsay and Blakiston, 1878.

ing was becoming apparent in the writings of American dentists.

P. H. Austen revised the tenth edition of Harris's[35] *The Principles and Practice of Dentistry,* which was published in 1879. In the chapter entitled "Irregularities of the Teeth" there are sections on "Deformity From Excessive Development of the Teeth and Alveolar Ridge of the Lower Jaw" and on "Protrusion of the Lower Jaw," but reference is not made to prognathism.

In the same year Allen[36] gave an account of "protrusion of the lower jaw and treatment" and Wardle[37] presented a paper, "Protrusion of the Lower Jaw—A Case in Practice." On these occasions, also, prognathism was not used.

Improvement of Anthropologic Definition

At the time when dentists were beginning to drift into a period of individualism and confusion with regard to prognathism, anthropologists were becoming dissatisfied with the confusion which had resulted from individualized methods and concepts. As a result an international congress of anatomists and anthropologists met at Frankfort, Germany, in 1884. The outstanding achievement of this congress was the "Frankfort Craniometric Agreement" which provided certain fundamental standards for modern craniometric methods.

One of the most important of these was the "Frankfort horizontal plane" which, among other things, provided a uniform base for angular measurements of facial structures. The Frankfort plane is merely that plane on which the skull is to be oriented during precise craniometric study. The plane is horizontal, and the skull to be observed is so oriented that the superior margin of the external auditory meatus and the inferior margin of the orbit is in contact with it. The precise positioning of the Frankfort plane with respect to the skull and the universality of its acceptance gave it advantages which no comparable previous base plane possessed. Furthermore, when the skull is oriented on the Frankfort plane it is in a position which approximates that in the normal erect individual. This was not the case in base lines of the facial angles of Camper, Saint Hillaire and Cuvier, Cloquet and Jacquart.

With an accurately established base plane and clearly located craniometric points it was possible for individual workers to compare their observations with greater assurance that the similarities and differences in results originated in the materials being studied and not in the methods by which the studies were made.

In the years that followed, craniometric methods were further refined and standardized. As methods became more precise it was only natural that the qualities being studied should be more rigidly defined. Since the qualities involved were purely physical, and since craniometric technic was largely concerned with linear, angular and volumetric determinations, it became a relatively simple task to define these qualities in mathematical terms. There remained only a matter of arriving at standards for the definitions, and this was eventually accomplished through study, discussion and agreement. The subject of prognathism has been as completely covered by this method as any other quality treated by the science of craniometry.

Before leaving this phase of the subject it might be well to present the mathematical definitions of prognathism and related qualities and the methods by which they are observed. It must be pointed out again, however, that these standards were not all established at the

35. Harris, C. A., *The Principles and Practice of Dentistry,* ed. 10 (revised by P. H. Austen). Philadelphia: Lindsay and Blakiston, 1879, p. 420.

36. Allen, G. S., Protrusion of the Lower Jaw and Treatment, in proceedings of the New York Odontological Society. *D. Cosmos* 21:92 (Feb.) 1879.

37. Wardle, Thomas, Protrusion of the Lower Jaw—A Case in Practice. *D. Cosmos* 21:371 (July) 1879.

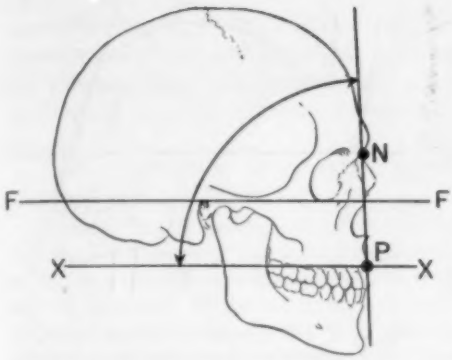

Fig. 4.—Facial angle, NPX, by which prognathism may be determined. Base line of the angle is the Frankfort horizontal plane, F-F, or any plane parallel to it, such as X-P

same time but that they were the results of a rather continuous process of development which extended well up into the twentieth century, and indeed which is still active.

The total facial angle is determined by the intersection of the Frankfort plane with another plane which passes through nasion and prosthion (Fig. 4). If the angle is 69 degrees or less the skull is hyperprognathous; if the angle is between 70 degrees and 79 degrees the skull is prognathous; if the angle is between 80 degrees and 84 degrees the skull is mesognathous; if the angle is between 85 degrees and 92 degrees the skull is orthognathous, and if the angle is 93 degrees or greater the skull is hyperorthognathous (Fig. 5).

The alveolo-subnasal angle is determined by the intersection of the Frankfort plane with another plane which passes through prosthion and the subnasal point or the anterior nasal spine. The angular limits for the various qualities are the same as for those of the total facial angle except that a state of hyperprognathism exists if the angle is between 60 degrees and 69 degrees, and if the angle is 59 degrees or less the condition is one of ultraprognathism.

The nasal angle is determined by the intersection of the Frankfort plane with another plane which passes through nasion and the subnasal point. Again, the various qualities of the angle are mathematically defined. There are numerous textbooks on anthropology and physical anthropology in which this general subject is treated in varying detail. A rather comprehensive text in three volumes was written by Martin,[38] but it must be read in the original German.

Development of Confusion

While the anthropologists were attempting to arrive at a more precise definition of prognathism, dental usage tended to make precise transmission of its concept more difficult. The problem was not too great so long as men like Oakley Coles, who was fully familiar with the original meaning, employed the term in modified form to express an entirely different concept and were careful to explain the nature of the modification. Writers such as Iszlai[39] and Sternfeld[40] could use the term with harmless versatility because they distinguished between the prognathism of the anthropologists, which they referred to as "prognathia ethnologica," and the "pathological prognathism" of the dentists. But when undiscriminating readers began to lose sight of the distinction between the two concepts and came to believe that the term applied only to a pathologic condition, it gradually became apparent that the adaptation was not without undesirable effects.

A fleeting but interesting glimpse of a developing confusion about prognathism is seen in the writings of Talbot, of Chicago, whose numerous works were

38. Martin, Rudolf, *Lehrbuch der Anthropologie*, ed. 2. Jena: Gustav Fischer, 1928, vol. 2.

39. Iszlai, Joseph, Carabelli's Mordex Prorsus and Its Relations to Prognathia Ethnologica, and to Meyer's Crania Progenaea. *Tr. 7th Inter. M. Cong.* 1881.

40. Sternfeld, Alfred, Anomalien der Zähne, in *Handbuch der Zahnheilkunde*, 1891.

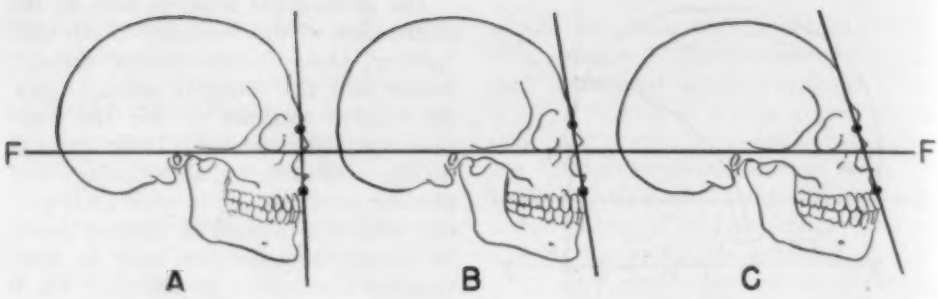

Fig. 5—Varying degrees of normal facial protrusiveness. A, orthognathous (facial angle, 86 degrees); B, mesognathous (facial angle, 81 degrees); C, prognathous (facial angle, 72 degrees)

published during the latter years of the nineteenth century. In 1887 he spoke of "protrusion of the upper jaw" and "protrusion of the lower jaw" but not of prognathism.[41] In 1888 he wrote:[42]

> Dr. Oakley Coles, in his work upon "Deformities of the Mouth" ascribes the different deformities of the jaw to premature ossification either of the sutures or the basis cranii. Thus he says that "the deformity known as intermaxillary prognathism is the result of a force operating on the intermaxillary bone, such force originating in the body of the sphenoid, and being transmitted by the intervening nasal septum."

Talbot had not yet, apparently, formed a definite preference for any particular usage of prognathism, for he did not challenge Coles's use of it. In the same paper[42] he quoted from Edmond Mazier's thesis, "On Arrest of Development in Idiocy," (Paris Thesis, No. 452, Paris, 1879) using the terms "superior prognathism" and "inferior prognathism." Whether this usage is to be attributed to Talbot or to Mazier can not be known without reading the original thesis.

In the second part[43] of the same paper is this:

> Now, we know that it is the superior maxillary prognathism of the negro that so clearly distinguishes the negro's face from the orthognathous face of the white; and this variety of prognathism arises from that portion of the superior maxillary bone situated below the nose, and comprising the alveoli of the incisors and cuspids.

Talbot's supposed knowledge on this point must have been derived from rationalization rather than observation, for the prognathism of the negro is more than alveolo-subnasal and it seems to be a characteristic contributed to by both the mandible and maxilla though usually measured only in the upper face.

We read:[43]

> The prognathism of the jaw increases with the age of the individual. It is, however, sometimes a natural growth, as noticed in the negro, and is characteristic of that race. In the American race it is mostly due to local causes.

It is evident here that Talbot conceived of prognathism as a single condition arising from either normal or abnormal factors. Detailed analysis of the two phenomena would have demonstrated to him that the resemblance was very superficial and that in reality they were entirely different. Later in the paper one sees "protrusion of the superior maxilla" and "protrusion of the inferior maxilla." One feels, after read-

41. Talbot, E. S., Etiology of Irregularities of the Jaws and Teeth. (Abstract) *D. Cosmos* 29:755 (Dec.) 1887.

42. Talbot, E. S., Etiology of Irregularities of the Teeth. *D. Cosmos.* 30:453 (July) 1888.

43. Talbot, E. S., Etiology of Irregularities of the Jaws and Teeth. II. Arrest of Development of the Maxillary Bones Due to Race-Crossing, Climate, and Soil. *D. Cosmos* 30:533 (Aug.) 1888.

ing this paper, that Talbot was acquainted with the anthropologic concept of prognathism only superficially, but sufficiently to make him overconfident in the use of it.

Two years later in another paper Talbot[44] said:

> On page 86 of his work Coles makes the following statement—"The deformity known as intermaxillary prognathism is the result of a force operating on the intermaxillary bone, such force originating in the body of the sphenoid and being transmitted by the intervening nasal septum." . . . In this case the force would not only be exerted upon the intermaxillary bones but also upon the maxillary, palate, turbinated, lachrymal, nasal and malar bones as well; in other words, all of the bones of the face would be acted upon, giving an apish appearance to the face rather than producing prognathism.

It seems rather evident that Talbot had forgotten whatever he knew about the anthropologic concept of prognathism, for the "apish appearance to the face" is nothing if not prognathous.

In discussing the above paper, Truman[45] appeared to adhere to the anthropologic concept of prognathism and may have been a bit confused by Talbot's use of it, for he said:

> . . . I fail to find that, even in comparison with the cave man who lived before the pyramids, the jaws of man have changed except to produce new types from the prognathous jaw that prevailed in the earliest periods of the world's history. . . .

In 1891 Talbot[46] wrote:

> Prognathism of either the upper or the lower jaw is frequently occasioned by abnormal development of the opposite jaw, a purely local cause.

He had shown some verbal familiarity with craniometric methods, including the measurement of the facial angle by which prognathism is determined, but he appeared unable to utilize the concepts which the symbols represented. He confused the normal with the abnormal, and unintentionally he implied that a conclusion can be drawn concerning the lower jaw from a measurement applicable specifically to the upper jaw. This was because prognathism to him had become a symbol of many confused concepts.

In another paper published the same year he included this statement:[47]

> . . . While the jaw is not quite as large as the normal jaw, the teeth are very regular, finely developed, and without a cavity. It would be rare to find a more nearly perfect arch. The articulation with the inferior maxilla is at all points exact, and we have here a marked illustration of an orthognathous jaw. . . .

This appears to be an early expression of another misconception developing from a misunderstanding of prognathism. Here it is suggested that prognathism refers to abnormal protrusiveness of the dental apparatus and orthognathism refers to normal occlusion. This misconception was expressed dogmatically as a truth a few years later by others, and it is still encountered in dental literature.

It must not be supposed that Talbot alone was responsible for furthering the aberrant usages of prognathism. In the first edition of his book, *Orthodontia*, published in 1889, Guilford[48] referred to "protrusion of the upper jaw" and to "protrusion of the lower jaw or prognathism."

In 1891 a report of a joint union meeting of the New Jersey and Pennsylvania State Dental Societies contained this statement:[49]

44. Talbot, E. S., Fallacies of Some of the Older Theories of Irregularities of the Teeth, With Some Remarks on Diagnosis and Treatment. *D. Cosmos* 32: 181 (March) 1890.

45. Truman, James, discussion of Talbot's paper. *D. Cosmos* 32:294 (April) 1890.

46. Talbot, E. S., Scientific Investigation of the Cranium and Jaws, in proceedings of the Mississippi Valley Association of Dental Surgeons. *D. Cosmos.* 33:389 (May) 1891.

47. Talbot, E. S., Mouth-Breathing Not the Cause of Contracted Jaws and High Vaults. *D. Cosmos* 33:919 (Nov.) 1891.

48. Guilford, S. H., *Orthodontia.* Philadelphia: Spangler & Davis, 1889.

49. Young, H. N., in proceedings of the Joint Union Meeting of the New Jersey and Pennsylvania State Dental Societies. *D. Cosmos* 33:1101 (Dec.) 1891.

Dr. H. Newton Young, Wilkes-Barre, Pa., presented casts of the jaws of a patient afflicted with acromegaly. . . . The lower jaw is enormously hypertrophied and massive, the chin projecting forward and causing a decided prognathism. . . .

In 1892, Kingsley,[50] in describing certain cases of dental malocclusion, said:

. . . The curious part is the occlusion of the jaws; the upper one shuts inside the lower, as seen in the articulated models. . . . I believe this prognathism to be a peculiarity inherited from the mother. . . . Another case of prognathous jaw . . . is that of a girl thirteen years of age. . . . The lower jaw here not only shuts far in advance of the upper one, but there are only two points where the teeth come in contact.

In the same year, Case[51] wrote of the treatment of an orthodontic case (which would now be included in class II of the Angle classification):

The only apparatus that was used to overcome the prognathous position of the teeth and jaw was a simple band extending from the molars around the front teeth. . . .

In the following year one of his writings referred to "prognathous lower jaw" and "prognathous upper jaw."[52]

In 1897 Goddard[53] listed "lower protrusion or prognathism" as class 12 of his "Classification of Irregularities."

In the third edition of *Orthodontia*, published in 1898, Guilford[54] said:

Among the more prominent of these [irregularities or deformities] are protrusion of the upper teeth, prognathism, and lancet and constricted arches.

On the following page there is a section heading entitled "Inferior Protrusion or Prognathism."

In 1899 Ottolengui[55] wrote of "prognathism of the upper jaw."

At the turn of the century it was becoming obvious to the more profound minds in dentistry that existing nomenclatures of dental malocclusions were unsatisfactory. Once again there was renewed activity, this time in America, to improve the situation. A new classification system was devised by Angle,[56] who wrote:

These terms seem to the author to far more nearly meet our requirements than the very limited and commonly employed terms, prognathism and orthognathism, which were introduced by the craniologists for describing the variations of the facio-cranial angle of man and the lower animals, but which are wholly inadequate for expressing the variations caused by malocclusion of the teeth and asymmetrical development of the bones and muscles of the face.

In 1906 Guilford[57] too expressed his interest in the "nomenclature of orthodontia" but he appeared reluctant to discard the use of prognathism and orthognathism, which he completely misunderstood. He said:

Prognathism and orthognathism, the former meaning protrusion of the mandible and the latter a normal vertical relationship between the upper and lower anterior teeth, are strictly scientific words. Mandibular protrusion, however, might well have been substituted for prognathism. . . .

There were those who were unwilling to eliminate entirely the anthropologic consideration of the face in determining the specific qualities of dento-facial deformities, but these men were usually able to appreciate normal variations in the form of the face upon which abnor-

50. Kingsley, N. W., Adenoid Growths, Mouth Breathing, and Thumb-Sucking in Their Relation to Deformities of the Jaws and Irregular Teeth. *D. Cosmos* 34:442 (June) 1892.

51. Catching, B. H., (edited by), *Catching's Compendium of Practical Dentistry for 1892.* (Case, C. S., Protrusion of the Upper Front Teeth and Close Occlusion of the Jaws.) Atlanta: Constitution Publishing Company, 1893, p. 175.

52. Case, C. S., Some Principles Governing the Development of Facial Contours in the Practice of Orthodontia, in proceedings of the World's Columbia Dental Congress. *D. Cosmos* 35:959 (Sept.) 1893.

53. Kirk, E. C., *American Text-Book of Operative Dentistry.* (Goddard, C. L., Orthodontia Exclusively as an Operative Procedure.) Philadelphia: Lea Brothers & Co., 1897, p. 577.

54. Guilford, S. H., *Orthodontia*, ed. 3. Philadelphia: T. C. Davis & Sons, 1898, p. 24.

55. Ottolengui, Rodrigues, Extraction and Delay Versus Expansion and Early Interference in the Treatment of Prognathism. *Tr. Nat. D. A.*, 1899, p. 398.

56. Angle, E. H., Classification of Malocclusion. *D. Cosmos* 41:350 (April) 1899.

57. Guilford, S. H., The Nomenclature of Orthodontia. *D. Cosmos* 48:133 (Feb.) 1906.

malities of occlusion were superimposed. Lischer[58] stated this very simply when he wrote:

> The degree of prognathism, or position of the denture in its relation to the skull as a whole, must also be taken into consideration.

He was familiar with craniometric methods, in addition to his accomplishments in orthodontia, and his concepts were sufficiently accurate for him to avoid confusion.

In the following years, during which the matter of terminology was still a favorite subject, numerous articles were published in which a modified anthropologic terminology was supported. Unfortunately, not all who recommended this course were sufficiently familiar with the concepts and objectives of physical anthropology on which the proposed systems were to be based. Wallace[59] said:

> With regard to the jaws, the classification should be taken from that already given by anthropologists, and that could be improved upon. . . . If the upper jaw was too far forward it could be called upper prognathism, a word used by anthropologists. If the lower jaw was prognathic, why not use the word prognathic if a word must be had for it.

Wallace had overlooked the primary objective of physical anthropology, which was to determine norms for the various physical qualities of the different racial groups of mankind. He ignored the fact that the anthropologic terminology represented concepts dealing with normal characteristics only. He seemed unaware of the dangers of confused concepts, for he recommended the same course which had produced all of the confusion about prognathism during the preceding 35 years.

Language differences, too, have contributed to the developing confusion about prognathism. It is well known that concepts often suffer as the result of translation. European writers have frequently been made to appear to have employed prognathism in other than the anthropologic meaning when in reality they did not refer to prognathism in their original papers. It is true that many European authors have used the word in a manner similar to that found in American dental literature but these men have not been misquoted. The following example will serve to demonstrate the more obvious type of mistranslation, for it contains the evidence by which it is incriminated.[60]

> The March 1915 number of the Deutsche Monatsschrift für Zahnheilkunde, however, contained a review of Kantorowicz's "Prognathism and its Heredity" (Die Progenie und ihre Vererbung) in which it was stated that the writer in 1914 had given lectures concerning this subject in Berlin. . . .

As previously noted, progenie, to European dentists, has long meant protrusion of the lower jaw, whereas prognathism has been applied to abnormal protrusion of the maxillary structures. Granting that from an anthropologic point of view the application of the term to abnormalities of either upper or lower jaw is confusing, certainly the confusion is heightened when authors appear to say what they did not intend. This specific type of confusion has been the result of confusion of translators about the concepts they attempted to translate.

Summary

It has been shown that prognathism is a word which is now being used to describe many characteristics of the face, both normal and distinctly pathologic. This has resulted in considerable confusion which, in turn, has fostered misunderstanding. It is preventing many students of dentistry from obtaining clear ideas of some of the fundamental aspects

58. Lischer, B. E., *Principles and Methods of Orthodontics*. Philadelphia: Lea & Febiger, 1912, p. 106.

59. Wallace, J. S., in discussion of his article, A Short Note on Classification. *Inter. J. Orthodont.* 1:126 (March) 1915.

60. Nord, C. F. L., The Importance of Biology as Applied to Dentistry. *D. Cosmos* 58:297 (March) 1916.

of the human race. Because it has been employed so indiscriminately, the word prognathism is losing its scientific value, for it is obstructing the dissemination of precise knowledge.

It has been shown, also, that prognathism was first employed in the related sciences of anatomy and physical anthropology and that it has been in consistent use in these fields for more than a century. These sciences developed a specific concept to be expressed by the word and eventually defined prognathism so rigidly that no misunderstanding was possible. It has been observed that the term was later taken into the vocabulary of dentistry and medicine, in adapted form, to describe certain protrusive pathologic characteristics of the dento-facial structures. This adaptive usage was first employed with full knowledge of the original connotation, but the term seemed to fill a need so nicely, and was accepted so readily, that its original meaning was soon lost to its new users. Because the new usage was only vaguely defined, divergent usages soon developed. These too have not been subjected to precise definition and have been assumed to be defined only through indifferent custom.

In the interest of science, therefore, and in the interest of those professions which must progress through the utilization of the principles of human biology, it is strongly recommended that the term prognathism be reserved to express the concept as defined by anatomy and anthropology. By agreeing to this unambiguous definition, dentistry must eventually benefit through elimination of some of the misunderstandings which have confounded it. Through clearer comprehension of some of the biologic phenomena which have their expression in the dento-facial structures, dentistry will be in a more favorable position to contribute to the advancement of science. The Committee on Nomenclature of the American Dental Association is in the most effective position to make prognathism again a scientific and universally understandable word.

▲

Battle Losses From Bullets and Bacteria.—During the Crimean War the French lost eight men from disease for every one killed in battle, while the Russians lost twenty to one. The common causes for this disaster were cholera, typhus, dysentery, and infections. In the Spanish-American War seven soldiers were lost for every one who died in battle. In the Civil War fifty per cent of the wounded died, whereas in World War I six to twelve per cent of the wounded died, and in World War II the figure was only three per cent. The annual death rate overseas during World War I was 12.8 for each one thousand men abroad; in World War II, the figure was 0.5 per thousand men. In World War I, twenty to thirty per cent of soldiers who contracted pneumonia died; in World War II only one per cent. In World War I, of soldiers who contracted meningococcic meningitis, thirty-seven to thirty-nine per cent died, while in World War II only three to five per cent have been victims.—*Austin E. Smith, The Drugs You Use. New York: The Revere Publishing Company, 1948, p. 3.*

SIGNIFICANCE OF TESTS FOR BITING STRENGTH

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THE literature of dentistry contains many references to tests of biting strength. These tests have been conducted with a large variety of gnathodynamometers, which have utilized levers, springs, manometers or combinations of these. The findings of the various tests have been subject to widely different interpretations, and have in general stimulated but little interest in biting strength and its clinical significance. Nevertheless, the studies already accomplished have set the stage for further investigations at a time when masticatory force is beginning to be recognized as an essential factor in diagnosis and treatment.

Most frequently, interpretations of the results of tests for biting strength have been based on the assumption that they measure muscle lower alone. Yet it is clear that where muscle power is applied there must also be resistance to that power. Consequently, before the masticatory ability of a person can be effectively appraised, it is necessary to go beyond considerations of muscle size or tone and the number of teeth or occlusal contacts. There must be concern also for the capacity of the supporting tissues to tolerate a force sufficient for mastication of a satisfactory diet, with freedom from anxiety or physical discomfort. The tolerance of the supporting tissues may vary widely in health and in oral or systemic disease, and the relation which these variations may have to food choices and eating habits becomes readily apparent.

Although the results of tests for biting strength provide measurements which combine expressions of muscle power and resistance of supporting tissue, the power factor is not of great clinical significance except in growing children. Man—and, strange to say, even modern urban man—has in his masticatory muscles far more power than is ever required in mastication. Extreme expressions of that power are seen only under experimental conditions and during anesthesia, analgesia and certain emotional states. Under normal conditions these extreme expressions are inhibited by pain or by fear of pain or injury. Specifically, the limiting factors are the sensory mechanisms of the supporting tissues, principally the periodontal membrane, and anxiety or alarm reactions based on previous painful experiences.

There is nothing unique in the operation of these sensory or psychic factors that control expressions of masticatory force. Such factors are associated also with manual and other voluntary activities which may involve pain or injury if carried too far. A simple example is seen in the lifting of a heavy object. If the object is well within the lifting capacity of the individual, is smooth and does not excite deep pressure or pain sense in the hands, it can be lifted with ease. On the other hand, if the object is rough and has a surface which under pressure produces uncomfortable sensations in the hands, it is not likely to be

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lifted more than once if further lifting can be avoided. Many other examples of the sensory or psychic control of applications of muscular power in the normal activities of man might be given. They are both selective and protective, and are as significant with regard to mastication as with regard to any other voluntary physical activity.

That man has much greater power in the masticatory muscles than is required for the comminution of foods or can be tolerated by the supporting tissues has been shown by several investigators. Schroeder[1] reported an increase of 70 per cent in biting strength after block anesthesia. Adler[2] observed that surface anesthesia of the gingival tissue doubles the threshold values for lateral stress and increases those for axial stress by about 30 per cent. Mandibular conduction anesthesia increases the threshold values for axial stress from 50 to 70 per cent, and approximately doubles those for lateral stress. O'Rourke and Manly, using an electronic gnathodynamometer, observed that 10 subjects averaged 21 per cent higher in maximum biting force when they were subjected to maxillary or mandibular block anesthesia.

Apparently, ordinary mastication contributes but little to the maintenance of the power of the masticatory muscles, at least in the adult. This assumption appears to be supported by evidence that mastication calls on only a small portion of the total capacity of the muscles. The postural functions of these muscles and their use during speech and in swallowing make additional demands. These doubtless are largely responsible for the excess of muscle power beyond that required in mastication. Therefore, while muscle power is important, the fact that it is beyond the requirements of normal mastication indicates that the clinically significant factors are those which control or limit the masticatory force which may be applied.

Under normal conditions the biting strength of the human dentition follows a well defined pattern. Tolerance to masticatory force is greatest in the first molar area and decreases with progression posteriorly and anteriorly. Although there appears to be a definite relation between expressions of muscle power and the position of the tooth in relation to the critical point in muscle contraction, tolerance is a function of the root area, the suspensory quality of the periodontal membrane and the quality of supporting bone. When masticatory force is applied gradually to an extreme point, three types of sensation are experienced, in the following order: tactile sense, deep pressure sense and pain. Although tactile sensations are important, they do not contribute to the control of masticatory force. Deep pressure sensations arising from muscles, tendons, bone and periodontal membrane offer some indication of what is to come if the force continues to increase. As a consequence they warn the subject, who acts on the basis of his past experience.

In the healthy periodontal membrane which has been responding favorably to functional demands, the masticatory force required to excite pain sensation is far beyond that necessary for mastication of a satisfactory diet. This high tolerance to masticatory stress is reduced with lengthening of the clinical crowns, varying degrees of inflammation of the periodontal membrane, loss of osseous support and gingivitis. Inflammation is one of the most common and significant factors in reducing tolerance to masticatory stress. Schumacher[3] showed that in hyperemia of the skin the stimulus necessary to excite pain is decreased as much as 50 per cent. This finding is in harmony with the

1. Schroeder, Hermann, *Lehrbuch der Technischen Zahnheilkunde*, vol. 1, part 2. Berlin: Herm. Meusser, 1927, pp. 249-309.

2. Adler, Peter, Sensibility of Teeth to Loads Applied in Different Directions. *J. D. Res.* 26:279 (Aug.) 1947.

3. Schumacher, G. A., The Influence of Inflammation on the Pain Threshold of the Skin in Man, *Proc. A. Research Nerv. & Ment. Dis.* 23:166, 1943.

common observation of dentists that teeth with inflamed periodontal membranes are more responsive than normal to percussion or to masticatory stress. It does not matter whether the inflammatory reaction is due to local or systemic causes. The effects in lowering the pain threshold, and thus reducing the tolerance to masticatory stress, are the same.

Because the pain threshold is lowered in inflammation, it is evident that the tolerance to masticatory stress, or, in other words, the biting power, is reduced in teeth with deep caries, periodontal pockets and infected pulp. It is reduced also in the presence of influenza and other systemic conditions which may affect the periodontal membrane. This fact points to the fallacy of attempting to evaluate a dentition through the simple counting of teeth or occlusal contacts. Some persons with complete natural dentitions in fair occlusion have expressed biting power no better than that of the average patient with dentures. On the other hand, it is possible for persons with few remaining natural teeth to indicate high biting power. Much will depend on the difference in condition of the supporting tissues.

Psychic Factors in Biting Strength

The biting force which may be applied in experimental studies or during mastication is greatly influenced by psychic factors, fear of pain or injury being the most significant. Although the pain threshold of man appears to be fairly uniform, there are tremendous variations in the reaction to pain. These variations play an important role in determining the results of tests for biting strength and the force applied in mastication. As biting or masticatory force is applied, some persons will exhibit alarm or anxiety reactions to comparatively light pressures, and stop far short of the pain threshold. Others will tolerate greater pressures and come close to the point at which pain is excited. If test subjects are permitted to watch the indicator of the measuring device or to engage in competition with other subjects, they often will cut through the deep pressure warnings and bite until they are stopped by pain. When subjects are without competition or do not watch the progress of the indicator, they usually stop at some point in the range of deep pressure at which they become alarmed with regard to the possibility of injury or pain.

Other factors being equal, the point at which alarm or anxiety reactions cause cessation of the application of biting force will depend on the mental state. There is no significant difference in pain threshold between normal and psychoneurotic persons. However, in the psychoneurotic the alarm or anxiety reaction threshold is usually much lower. This was clearly indicated in the observations of Chapman and his associates.[4] Therefore, it appears reasonable to assume that practical considerations of masticatory function should take into account not only pain thresholds but also the marked variations in the reaction to pain or fear of injury.

In preliminary studies to determine the influence of psychic factors, O'Rourke, Manly and Braley[5] tested subjects under analgesia with 4 per cent nitrous oxide under a pressure of 2.5 mm. and under normal conditions. There was an average increase of 36 per cent in biting strength under analgesia. The subjects experienced pain, but their calm attitude and lessened anxiety caused them to express greater biting strength and often to maintain it for a longer period than under normal conditions. There are good reasons for believing that any analgesic drug will cause similar effects. Hardy,

4. Chapman, W. P.; Finesinger, J. E.; Jones, C. M., and Cobb, Stanly, Measurements of Pain Sensitivity in Patients with Psychoneurosis. *Arch. Neurol. & Psychiat.* 57:321 (March) 1947.

5. O'Rourke, J. T.; Manly, R. S., and Braley, Louise, unpublished report.

Wolff and Goodell[6-8] observed that although analgesic drugs raise the pain threshold, the accompanying elevation of the alarm reaction threshold is outstanding. This modification of the reaction to pain with a decrease in alarm or anxiety is now considered to be one of the important effects of morphine, codeine, the barbiturates and other analgesic drugs.

The relation of psychic factors to the force utilized in biting tests or in mastication has serious implications. Whatever may be shown by tests of biting strength, it is evident that uncomfortable deep pressure sensation and pain are not desirable accompaniments of mastication. Masticatory function usually is maintained at a level in harmony with physical comfort. In addition, there should be freedom from anxiety or apprehension. One's tendency is not only to avoid pain, but to stay so far away from pain that mastication can proceed in a more or less subconscious or reflex manner. For example, if under test conditions one experiences pain at a pressure of 125 pounds (57 Kg.), he may feel anxiety or alarm at from 75 to 90 pounds (34 to 41 Kg.). This will mean that in ordinary mastication, in the interest of freedom from anxiety, he may never express masticatory force beyond 40 to 50 pounds (18 to 23 Kg.).

A person who experiences pain on the application of 30 pounds (14 Kg.) pressure because of periodontal or other disease is likely to become apprehensive at a pressure of 20 pounds (9 Kg.) or less, and rarely will exceed 10 to 15 pounds (5 to 7 Kg.) pressure during mastication. Such a person is definitely handicapped in the range of foods he can masticate with speed and comfort.

Physiologic Reasons for Restricted Force

There are good physiologic reasons for maintaining masticatory effort at a point where there is freedom from anxiety. Mastication is supposed to be a comfortable and pleasurable activity. The chewing of food under conditions of relaxation is a stimulant to the first, or cephalic, phase of gastric secretion. Existing evidence gives strong support to the observation of Best and Taylor[9] that the cephalic phase of gastric secretion is something more than a physiologic curiosity. There is still some difference of opinion with regard to the value of the cephalic phase, but it is evident from the work of Pavlov,[10] Cannon,[11] Carlson[12] and others that the chewing of palatable food stimulates the flow of gastric juice, and the abundance of this flow depends to a large extent on the palatability of the food. The second, or gastric, phase of secretion appears to depend to some extent on the cephalic phase. In other words, one of the functions of the cephalic secretion is that of getting gastric digestion off to a good start. Here it may be well to consider that foods which are so dense or tough that they cause discomfort during mastication lose much of their palatability.

Basically, the factors which control the application of biting or masticatory force in persons with artificial dentures are the same as those in persons with natural dentitions. The factor of greatest influence from a sensory point of view is

6. Hardy, J. D.; Wolff, H. G., and Goodell, H., Studies on Pain. New Method for Measuring Pain Threshold: Observations on Spatial Summation of Pain. *J. Clin. Investigation* 19:649 (July) 1940.

7. Wolff, H. G.; Hardy, J. D., and Goodell, H., Measurement of the Effect on the Pain Threshold of Acetylsalicylic Acid, Acetanilid, Acetophenetidin, Aminopyrine, Ethyl Alcohol, Trichlorethylene, Barbiturate, Quinine, Ergotamine Tartrate, and Caffeine: An Analysis of Their Relation to Pain Experience. *J. Clin. Investigation* 20:63 (Jan.) 1941.

8. Wolff, H. G., Hardy, J. D., and Goodell, H., Studies on Pain: Measurement of the Effect of Ethyl Alcohol on the Pain Threshold and on the "Alarm" Reaction. *J. Pharmacol. & Exper. Therap.* 75:38 (May) 1942.

9. Best, C. H., and Taylor, N. B., *The Physiological Basis of Medical Practice*. Baltimore: Williams and Wilkins Company, 1943, p. 723.

10. Pavlov, I. P., *The Work of the Digestive Glands*, English ed. 2. London: C. Griffin & Co., Ltd., 1910.

11. Cannon, W. B., *Bodily Changes in Pain, Hunger, Fear and Rage*. New York: D. Appleton and Company, 1918.

12. Carlson, A. J., *The Control of Hunger in Health and Disease*. Chicago: University of Chicago Press, 1916.

the tolerance of the tissues supporting the dentures. This in turn is influenced by the surface characteristic of the base material in contact with the tissues and by the extent to which the forces of mastication are distributed throughout the supporting tissues.

The denture patient is likely to experience pain at comparatively low levels of biting force, and in addition to fear of pain he has the fear that the denture may be displaced if the force is increased. It is therefore natural that the denture patient who under test conditions expresses a biting force of 20 pounds (9 Kg.) should use from 10 to 12 pounds (4 to 5 Kg.) during mastication. His reactions are the same as those of persons with natural dentitions. There is a strong desire to avoid not only pain but also anxiety. For these reasons, too liberal interpretation of the findings of tests for biting strength should be avoided. Obviously the subject will not put forth during mastication the effort he uses in a test.

If the influence of psychic and sensory factors in controlling the force utilized by denture patients is weighed against the force observed under test conditions, it becomes obvious that there is but little margin available for comfortable mastication, and this is often greatly reduced or entirely eliminated by the dentist who regards denture prosthesis as a simple handicraft. That the margin of safety is small is indicated by biting strength tests on denture patients. Black[13] reported biting strength ranging from 20 to 30 pounds (9 to 14 Kg.) in subjects wearing full upper and lower dentures. Brown[14] reported an average biting pressure of 29.22 pounds (13 Kg.) and a mean pressure of 21.45 pounds (nearly 10 Kg.) in 18 subjects. Klaffenbach[15] observed an average biting strength of 22.3 pounds (10 Kg.) for the molar and 24.1 pounds (11 Kg.) for the bucuspid area. Worner[16] found the average biting pressure in male denture patients to be 23 pounds (more than 10 Kg.) for the molar, 26 pounds (12 Kg.) for the bicuspid and 16 pounds (7 Kg.) for the incisor area. Hardy[17] used an electronic gnathodynamometer to test biting strength in the bicuspid area in 14 subjects and found a range of from 6 to 30 pounds (3 to 14 Kg.) with an average of 20 pounds (9 Kg.)

Implications of Low Tolerance

Although there is but little information on the force required to masticate various foods, it is evident that persons with low biting force tolerance must narrow their range of food choices. This is especially true for persons with poorly fitting dentures or severe periodontal disease. Black[13] in direct crushing experiments found a range of from 5 pounds (2 Kg.) for certain meats to 170 pounds (77 Kg.) for one type of nut. Head, using a method which involved trituration, reported for meats a required force ranging from 3 to 30 pounds (1 to 14 Kg.). Schröder reported the following forces required to masticate various foods: boiled beef, 29 to 47 Kg. (64 to 103 pounds); fried beef, 35 to 40 Kg. (77 to 88 pounds); fried pork, 24 to 32 Kg. (53 to 70 pounds); smoked ham, 18 to 24 Kg. (40 to 53 pounds); fried liver, 10 to 12 Kg. (22 to 26 pounds) and dry bread with crusts, 80 to 120 Kg. (176 to 264 pounds). No references appear to be available with regard to the force required for mastication of fruits and vegetables. However, many of these essential components of the modern diet will present difficulties in mastication for the person with low tolerance to biting stress.

13. Black, G. V., The Force Exerted in the Closure of the Jaws. *D. Cosmos* 37:469 (June) 1895.

14. Brown, D. W., An Experimental Study of Masticatory Stresses in Full Denture Reconstruction. *Northwest. Univ. Bul.* 32:2 (Oct. 26) 1931.

15. Klaffenbach, A. O., Gnathodynamics, *J.A.D.A.* 23:371 (March) 1936.

16. Worner, H. K., Gnathodynamics, *Austral. J. Den.* 43:381 (Nov.) 1939.

17. Hardy, I., unpublished report.

It is well established that persons with impairment of any voluntary physical function must make certain adaptations to their deficiency. Although some of these adaptations are partially compensatory, others are potentially or actually injurious. Where there is low tolerance to masticatory force, some slight compensation is possible through greater use of the tongue. It is probable also that in young, healthy persons, the mechanical functions of the stomach may in part compensate for the impairment of mastication. The most effective way of overcoming the handicap is through an increase in the number of chews or the time devoted to mastication. Yet, this type of adaptation appears to be rare. Dahlberg in his study of a large number of subjects observed that the number of chews was not increased with impairment of mastication. The number of chews given the various types of food appears to be related to the density or toughness of the food and to fixed habits of mastication. Furthermore, it is not to be expected that persons with greatly impaired masticatory function will prolong to any great extent the time devoted to eating. Therefore, to avoid discomfort or prolonged effort in mastication, other adaptations usually are made. These consist of changes in swallowing habits and in choices of food.

The habit of swallowing larger and coarser food masses appears to be readily formed by many persons, and many persons assert that despite obvious impairment of masticatory function, they can eat anything without discomfort. If eating consists merely of causing the passage of food from the mouth to the stomach, then these claims can be supported. But eating is something more than swallowing. Consequently, these claims for efficiency in eating despite marked impairment of masticatory function are obviously unsound and are for the most part wishful thinking.

The most common adaptation to be found among persons with inadequate dentitions consists of a change in food choices with increased emphasis on foods that are easily masticated. Too frequently this means a monotonous diet of soft and nutritionally inadequate foods. These shifts in emphasis, which bring the physical character of the diet into harmony with the dentition and with the desire for comfort in mastication, do not in general differ from the adaptations made in the case of other impaired voluntary functions.

Conditioning of food choices by impairment of mastication, digestive disorder, habit or other factors was not considered important when food was simply food and the calorie was the yardstick of nutrition. By modern nutritional standards, proper food choices are known to be of great significance. Therefore, it is important to consider tolerance to masticatory force as it may be related to nutritional status, especially for denture patients, because of their low range of tolerance to masticatory force. This is particularly true for sensitive, neurotic persons with a low anxiety or alarm threshold.

The effects that low biting tolerance may have on food choices, and as a consequence on nutrition, have been pointed out by Boas[18] and other students of nutrition in older persons. The geriatric phase of the problem of nutrition is of obvious significance in relation to denture prosthesis. The greatest need for denture prosthesis exists in the older section of the population—a section which in terms of nutrition was largely neglected in the past.

The frequent and casual disregard of the masticatory function of elderly persons appears to have its origin in the common assumption that they need but little food and that a diet adequate for

18. Boas, E. P., *Treatment of the Patient after Fifty*. Chicago: Yearbook Publishers, 1941.

them requires the use of few if any teeth. There is no evidence that elderly persons require less food than they did during middle age. Tuohy[19] pointed out:

> For reasons hard to understand, there is the widest belief that the elderly should be abstemious. . . . Perhaps "the less food for old people" fallacy hinges on the supposition that, for them, energy for current expenditure is the chief item and therefore carbohydrate and some fat with a minimum of protein suffice. In any case, that is the way many old people exist but do not live.

Although older persons leading a comparatively inactive life may require less caloric intake than they did during their active years, it is obvious that proper nutrition should be maintained. This does not mean nutrition as judged by outmoded standards, but rather a nutritional status evaluated in terms of present knowledge.

Moreover, the incidence of gastrointestinal disorders increases with age. The elderly person with a digestive disorder usually engages in a form of negative therapy, excluding from his diet those foods which cause distress. If at the same time there is low tolerance to masticatory force, the range of food selection is further narrowed. The possibility of poor nutrition in such cases is readily apparent.

Summary

Under normal conditions the biting force used in mastication is limited not by muscular power but by pain or by fear of pain or injury. The muscles of mastication have more power than ever is required in mastication, because they are maintained by postural function and speech. When masticatory force is applied gradually, three types of sensation are experienced—tactile sense, deep pressure sense and pain. In tests of biting force subjects usually stop at some point in the range of deep pressure at which they become alarmed by anticipation of injury or pain. In ordinary mastication even lower forces probably are used. Masticatory effort is carried on at a level at which there is freedom from anxiety.

Many foods that are essential for adequate nutrition will present difficulties in mastication for a person with low tolerance to biting stress. He will attempt to make adaptations to this deficiency, but unfortunately the commonest compensations are apt to be detrimental. They include swallowing of larger or coarser food masses and choice of softer foods. Such changes may lead to malnutrition, especially among elderly persons.

19. Tuohy, E. L., Feeding the Aged, in *Handbook of Nutrition*. Chicago: American Medical Association, 1943.

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Length of Life in the Middle Ages.—The information available regarding the average duration of human life in the Middle Ages comes as a by-product of records concerning inheritance of property. Such records have been used by J. C. Russell to find the average length of life for a generation of males born in England before 1276; his computations show an average of 35 years. This figure, which represents at best the situation among the more favored economic classes, may be indicative of some gain in longevity since the beginning of the Christian era.—*"Longevity From Ancient to Modern Times," Statistical Bulletin, Metropolitan Life Insurance Company, October 1947.*

PREPARATION OF MANUSCRIPTS FOR MEETINGS AND PUBLICATIONS OF THE AMERICAN DENTAL ASSOCIATION

THE high standards of present dental scientific meetings have been developed only by the careful selection of essayists and clinicians. Each year the selection becomes more critical and the competition between essayists more keen. Program chairmen and essayists alike recognize the impropriety of wasting the valuable time of an audience with a poorly prepared paper. Fortunately, most dentists who have become sufficiently proficient to warrant an invitation to participate in a scientific program can prepare an acceptable paper.

However, some excellent technicians and operators are unaccustomed to presenting their material in written form. Aware of this, they seldom or never appear as essayists, with the result that their contributions are lost to the profession. Such dentists should obtain the assistance of a competent writer to aid in the preparation of their material.

General Suggestions

All papers delivered at meetings of the Association are subsequently referred to the Editor's Office, where they are considered for publication in THE JOURNAL. Much time and effort can be saved if the manuscripts are prepared in conformity with the style of THE JOURNAL. A paper that is not accepted for publication will be returned to the author, and the Association will waive any further claim to it.

Previous Publication.—An article that has been published previously under the same or a different title, or one that contains extensive excerpts from a previously published paper, is not acceptable for presentation at a session of the Association or for publication in THE JOURNAL.

Papers presented at a session of the Association should not be promised by the author to another organization for publication unless released by the Editor's Office of the Association.

Physical Preparation of Manuscript.—Manuscripts should be prepared in triplicate. The original copy and a set of illustrations should be given to the secretary of the Scientific Section immediately after its presentation. At the conclusion of the session the secretary will forward to the editor all papers delivered in the section.

One carbon copy should be forwarded by the essayist to the director of the Bureau of Public Information of the Association at least 60 days in advance of the session. This copy will be used for publicity purposes.

One copy should be retained by the essayist.

The original manuscript should be typed, double spaced, on one side of 8½ by 11 inch bond paper. Carbon copies may be on onionskin. Margins at least three fourths of an inch wide should be allowed on each side of the paper.

Title.—The title of the article should appear at the top of the first page of the manuscript, followed by the name of the author or authors. If a number of men have collaborated in the preparation of a paper, only two or at the most three should be listed as main authors. Others should be listed as consultants. Listing of

several authors for a single paper greatly increases the volume and complexity of work involved in indexing the article.

Gratitude.—Expressions of gratitude to persons who have assisted in the preparation of an article are without scientific value, and it is the policy of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION to delete them.

Signature and Address.—Authors should use a uniform style in signing articles in order to avoid confusion in indexing. For example, an author should not sign one article John J. Jones, another J. J. Jones, and still another John James Jones or J. James Jones, Jr.

The academic degrees of the author and the name of the city in which he practices or resides should follow his name. Earned degrees only are published in THE JOURNAL. Honorary degrees are deleted.

The street address of the principal author should be given at the end of the paper.

Introductory Footnotes.—The name of the section of the Association or the society before which the paper was delivered and the date and place of delivery should be given in a footnote. The author's university, hospital or government position should also appear in a footnote.

Use of Trade Names.—The use of trade names of products and appliances should be avoided wherever possible. The importance of using correct terminology instead of proprietary names or nondescriptive terms can not be overstressed. The scientific names of pharmaceuticals accepted by the Council on Dental Therapeutics are listed in the *Accepted Dental Remedies,* published by the Association.

Proper Names and Abbreviations.—Spelling of proper names should be verified by reference to standard works.

Abbreviations should be used sparingly. Nonstandard abbreviations should be used only when necessary to conserve space in tables, and then they should be carefully explained.[1] If an operation or procedure bearing a man's name is used, it should be one well-known to the profession or defined in the standard medical dictionaries; otherwise it should be explained fully by the author.

Subheadings.—Short subheads or division headings are desirable in long or medium length papers. Manuscripts of less than 1,200 words may not require them. Subheadings aid the author to present his material logically, enable the reader to select quickly the subtopics in which he is most interested and improve the appearance of the article by breaking up pages of solid type.

Quotations.—If material is quoted from another author, permission must be secured from both the author and the publisher as required by copyright laws. The responsibility for securing this permission rests primarily on the writer. Quoted material should be quoted exactly except that obvious typographic errors should be corrected.

Construction of a Scientific Manuscript

Purpose of Article.—Manuscripts submitted for publication in THE JOURNAL of the Association should (1) present new facts, describe new technics or methods of practice, or set forth or re-evaluate principles of real value, (2) contain the results of well-controlled, original research or (3) provide a complete review of the facts concerning a particular subject so that the reader may deduce therefrom legitimate, important conclusions.

Outline.—The writing of a scientific manuscript can be expedited by first preparing a comprehensive outline. A good outline also aids in preventing the author

1. For additional information on the use of abbreviations see Fishbein, Morris, *Medical Writing,* ed. 2. Philadelphia: The Blakiston Company, 1948.

from committing common errors of repetition, verbosity and circumlocution. A simple outline consists of headings for each of the main divisions of the subject and subheadings for the secondary topics to be discussed under each main head.

A standard formula, and one preferred by THE JOURNAL for scientific articles, consists of the seven following parts: (1) title, (2) introduction, (3) presentation of original data, (4) discussion of data, (5) summary, (6) conclusions and (7) bibliography.

1. Title. The importance of a good concise title can not be overstressed, as titles serve three principal purposes. They designate the subject, attract the reader and are one of the principal means by which articles are indexed. Many good articles are lost to the literature because they are not indexed or are improperly indexed owing to poor or inaccurate titles.

Interrogations should not be used as titles. Attention-getting titles are acceptable if they express the content of the paper and are not inane or flippant.

2. Introduction. The introduction should include a statement of the subject or problem to be discussed and, if advisable, a limited amount of historical data. A review of pertinent literature is valuable and often necessary, but unless the references are selected carefully the review will be worthless. Ordinarily, numerous and extensive quotations from previous writers should be avoided as they give the paper a hodgepodge appearance and detract from reader interest. Short quotations are justifiable and mention of the works of others is often essential in a scientific paper, but bibliographic references should take the place of extensive discussions of previously published material.

3. Original Data. The original data should include a detailed description of the methods and materials employed by the author, supplemented with appropriate charts, tables, graphs and other illustrations. Data presented in charts and tables should not be duplicated in the text.

4. Discussion of Data. This consists of a presentation of the author's views, findings and conclusions based on the original data presented. The author may wish to compare his findings with those presented by others.

5. Summary. The summary should consist of a concise statement of the purpose of the article and the main facts presented. It should recapitulate observations or repeat statements of fact. Articles of less than 1,500 words usually need no summary.

6. Conclusions. The conclusions consist of deductions based on the data presented or reviewed. They usually consist of numbered sentence statements.

The busy dentist appreciates a good summary and conclusion as these help him determine whether it is worth while to read the entire article.

7. Bibliography. Bibliographic references should be listed at the end of the paper. They should be numbered to correspond with the numbers placed in the text where they are mentioned.

References.—References to articles published in periodicals should include the family name and initials of the authors, the title of the article, the name of the periodical, and the volume, page, month and year. Example: Jones, E. X., and Keyson, O. L., Oxidation of Cellulose by Nitrogen Dioxide. *J.A.D.A.* 31:1458 (Oct.) 1944.

References to books should include the name of the author, title of the book, edition, location and name of the publisher, and year of publication. Example: Boyd, William, *A Textbook of Pathology*, ed. 2. Philadelphia: Lea and Febiger, 1943. A list of standard abbreviations of dental publications can be se-

cured from the Bureau of Library and Indexing Service of the American Dental Association or by consulting past issues of THE JOURNAL.

Illustrations and Tables

Good, clear illustrations, preferably unmounted glossy print photographs, should accompany the manuscript. Illustrations should be numbered consecutively in the order in which they are to appear and should be referred to by number at the proper place in the text. Each illustration should bear the author's name.

If explanatory marks such as letters or arrows are absolutely necessary, they should be drawn on the photograph by an accomplished artist. If the author does not have access to an artist he should indicate clearly, on transparent paper laid over the illustration, the position of the markings so that they may be made by THE JOURNAL'S artist.

Paper clips or hard pencil marks on the backs of photographs may mar them and cause shadows in the finished illustration.

Legends.—Short descriptive legends should be typed on a separate sheet of paper and numbered to correspond to the numbers on the illustrations.

Drawings and charts should be made on cardboard or chart paper with India ink by an accomplished artist. Chart paper should have a background of black lines if the background is to be retained. Blue does not reproduce in the engraving process.

Tables should be given a heading and numbered to correspond to the reference number that is inserted in the appropriate place in the text.

Alterations.—Editorial alterations will be made in order that the article may conform to the style of THE JOURNAL. *Webster's New International Dictionary*[2] is the guide used by THE JOURNAL for academic terms and *The American Illustrated Medical Dictionary*[3] for medical and anatomic terms.

2. *Webster's New International Dictionary*, ed. 2. Springfield, Mass.: G. & C. Merriam Company.

3. Dorland, W. A. N., *The American Illustrated Medical Dictionary*, ed. 21. Philadelphia: W. B. Saunders Company, 1947.

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Grammatical Form and Usage.—Good usage in speaking and writing English is a goal toward which all of us are constantly striving. Although some writers and speakers seem to have an extraordinary gift for using words correctly, for pronouncing words correctly, and for spelling words correctly, there are a great many men and women who find themselves quite uncertain as to the exact usage or exact form of a word or expression which they need at a given moment. One of the great difficulties is that the rules of good usage in English do not for the most part apply to a large number of instances; we find that there are a great many exceptions to rules. Consequently the most helpful method is to study the correct forms of individual words and expressions, and along with them such rules as do apply.—*Alexander M. Witherspoon, Common Errors in English and How to Avoid Them. New York: The New Home Library, 1943.*

THE NATIONAL DENTAL HEALTH PROGRAM OF THE NETHERLANDS

Charles F. L. Nord, D.D.S., Amsterdam

BECAUSE the problem of dental health is important and must be solved through professional advice to the government, I am presenting the following summary of experience in The Netherlands:

For many years before the war, private "sick funds" provided medical and partial dental care for a certain sum of money. The dental profession had contracts with these funds, stipulating the kind of treatment to be given. Treatment included fillings, extractions and dentures.

About fifteen years ago, the profession in Holland stated that such partial treatment was not only sheer nonsense from a social point of view but malpractice. Therefore, dentists were forbidden by the dental association from inserting fillings in a mouth that had not been cleaned and in which needed extractions had not been made. By this means patients were given some idea of elementary oral hygiene, and dentists were freed from the obligation to act against their professional consciences.

Since the war, the state has taken control, and a compulsory health service has been started for everyone with an annual income below 3,750 florins (about $1,500). Both employer and employee are taxed 2 per cent of wages to finance the service, which includes dental treatment. Should the 4 per cent payroll deduction prove inadequate to cover the costs of the service, the tax will be increased.

Patients can be treated either at the dentist's office or in a clinic, depending on the agreement reached between the authorities and the local dental society. In Amsterdam, dental clinics are used, but the dental society does not allow individual dentists to work there more than three hours a day. In this way it assures them the privilege of maintaining a private practice and the freedom to refuse further government work if at any time they do not agree with the prevailing policies. The patient has the right to choose his dentist.

For their three hours a day, dentists receive a salary of 5,000 florins (about $2,000) a year, a month's vacation, insurance against illness and a pension. This is not bad remuneration when it is considered that the florin has about the buying power in The Netherlands that the dollar has in the United States.

Funds Allocated for Dental Service

Fifteen million florins (about $6,000,000) is allotted from the health service fund for dental treatment, and the patient is charged a small amount (5 pence for a filling, 45 florins for a full denture) to interest him in the service. It would be difficult to estimate the average cost per patient, since it varies widely in large and small communities and in the country. The cost is growing also, as the demand for service increases.

At present, the profession is trying to care for the entire population. Emergency care is given to all, with priority to young persons. Pulp treatments are given only in special cases, and only simple fillings are made.

Actually, of course, full dental treatment for everyone is out of the question. Not only would it require more than six times the number of dentists now in practice, but it would cost so much that no government could afford it. For this reason, the dental profession, especially in Amsterdam, has persuaded the authorities to work toward a solution of the problem along other lines, and a state commission, consisting of government officials, employer and employee representatives and members of the medical, dental and pharmaceutical professions, has been appointed to advise the minister on amendments to the law.

School Dental Program

It is the conviction of the profession that the only way of eliminating the effects of dental diseases is to begin with care of young children. In Amsterdam, with a population around one million, it is proposed to begin with a school dental program and expand it to include preschool children, as has been done in Oslo, Norway. When the child leaves school, at 12 or 13, his mouth will be in good condition, and he will be eligible for free clinic treatment twice a year. If he does not come in for control treatments, however, he will lose the right to further free treatment and will have to pay for rehabilitation of his mouth before he will be accepted for free treatment again. The object of such a program, obviously, is eventually to have a population with as good teeth as can be maintained with available resources.

Dental hygienists and nurses are unknown in The Netherlands, but dentists generally are of the opinion that women should be trained to take part in the national dental health program.

Throughout the development of the present dental program, the profession has been consulted and has prescribed the conditions under which its members would take part. It is to be hoped that the program proposed for Amsterdam will be approved, since the public seems to agree that this is the only way to solve the problem.—*9, Johannes Vermeerplein.*

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The Twenty-five Dollar Assessment.—If the medical profession wants to spend $25 per member to defend and protect its position in the society of American democracy, that's a cheap price. But it has been suggested this money should be used in support of local health causes, etc., instead.

The fact is this: The average doctor probably spends 10 times that much every year on public-health causes—and he probably writes off his books enough every year on the account of people unable to pay their bills to make that proposed $25 look like a Sunday-school donation.

In Wenatchee doctors wrote off probaby 30 per cent during the bad years. They took it on the chin as individuals.

If Uncle Sam had been the doctor, the taxpayer would have taken that 30 per cent on the chin.

What most people don't know is that doctors as a rule do a great deal of charity work—and they would rather do it that way than to have a GP (Government Petrillo) back there in Washington looking down their collective throats.—*Fred C. Koch, editor, in The Journal (East Wenatchee, Wash.) Dec. 16, 1948.*

REPORTS OF COUNCILS

COUNCIL ON LEGISLATION

REPORT OF RECENT ACTIVITIES OF THE COUNCIL, AND BRIEF DIGESTS OF NEW STATE LAWS PERTAINING TO DENTISTRY

THIS is a report of the activities of the Council on Legislation and its staff since the convening of the Eighty-first Congress. In previous issues of THE JOURNAL the important Wagner-Murray-Dingell Bill has been discussed and analyzed at length, and through the medium of the News Section items of legislative interest have been reported.

Representatives of the Council on Legislation have appeared at three hearings before Congressional committees. In February Carl O. Flagstad, chairman, appeared before the House Committee on Appropriations and presented arguments showing why the committee should include an appropriation item of $2,000,000 in the Labor-Federal Security Agency appropriation bill for the purpose of constructing a building for the National Institute of Dental Research. Dr. Flagstad later appeared before the Senate Committee on Appropriations and repeated his arguments on the same bill.

Henry A. Swanson of Washington, D. C., at the request of the Council on Legislation, appeared before the House Committee on Expenditures in the Executive Departments to testify concerning H.R. 782, a bill to grant Cabinet status to the Federal Security Agency. Dr. Swanson urged that the health functions of the government be separated from the present functions of the Federal Security Agency and that Cabinet status be granted to a department which would combine all the health activities of the federal government. Dr. Swanson further urged that a bureau of dentistry be made an integral part of such a department of health.

The Council on Legislation has caused six bills to be introduced into the Eighty-first Congress. These are: House Joint Resolution 184, introduced by Congressman Feighan of Ohio, to establish the first Monday of February as National Children's Dental Health Day; H.R. 3208, H.R. 3209 and H.R. 3210, introduced by Representative Rankin of Mississippi, which are designed to improve the position of dentists in the Veterans Administration; and S. 1205 and H.R. 3479, introduced respectively by Senator Hunt of Wyoming, a dentist, and Representative Rivers of South Carolina, to improve the status of dentists serving in the Army.

The Council on Legislation has been following with interest a number of bills dealing with proposed federal aid to states for the use of local public health units; a bill to extend the benefits of old age and survivors to the self-employed; a bill to increase the postal rate on second class mail, enactment of which would increase the cost of publishing THE JOURNAL, and other measures which either directly or indirectly affect dentistry.

In addition to bills introduced into

Congress the staff of the Council on Legislation has reviewed more than 1,000 bills relating to health matters which have been introduced in the various state legislatures. It has advised state societies about legislation pending in their respective states which is of interest to dentistry. Notices of all legislative actions from time of introduction until the bill either becomes a law or is finally defeated are promptly sent out to those in the states who are concerned with legislation.

As a service to constituent and component societies, the secretary of the Council has accepted a full schedule of speaking engagements before such societies. The secretary discusses in detail the Wagner-Murray-Dingell Bill and its effect on dentistry, and conducts an open forum to answer the questions of those in attendance. To date he has addressed the Minnesota State Dental Society, the Western Michigan Dental Society, the board of directors of the Chicago Dental Society and the Blue Grass Dental Society of Lexington, Ky. He has additional engagements to speak at the Iowa state meeting and the Illinois state meeting and before the North Central Ohio Dental Society. Other engagements are tentatively scheduled.

The Council is making a study of all aspects of the compulsory health insurance problem and is preparing material for presentation to the Congress opposing the Wagner-Murray-Dingell Bill. It has developed and expanded its list of dentists who act as direct liaison agents between individual members of Congress and the Council. It has prepared and distributed to state societies sample resolutions on the subject of compulsory health insurance. These resolutions are intended to be adopted by component and constituent societies and transmitted to members of Congress as an expression of the views of organized dentistry.

The following new state laws are of interest to dentists. They have been briefly digested for information. Detailed analyses will be made available if requested.

In Arkansas a dentist has been added to the state board of health.

In Arizona the dental code has been amended and revised.

In Georgia the membership of the board of dental examiners has been increased from five to seven members. Dental schools are permitted to establish and collect fees for services rendered in teaching clinics. Provision is made for the issuance of a teacher's license in dentistry on reciprocity basis. A general average of 75 per cent on dental board examinations is now required before issuance of a license to practice dentistry. Dental hygienists must pass a written and clinical examination and be a graduate of a recognized school offering a dental hygiene course of not less than one year, before being licensed.

In Idaho the dental code has been revised and modernized.

In Nebraska dental hygienists are required to be graduates of a training school offering a two year course and are authorized to "remove lime deposts, accretions and stains from the surface of the teeth and to polish teeth." They may be employed only under the supervision of a licensed dentist by public institutions and school authorities. No dentist may employ more than one dental hygienist.

In North Carolina the board of trustees of the University of North Carolina has been authorized to establish a dental school.

In South Dakota cooperative associations have been authorized to provide medical services, and dental hygienists have been authorized to apply "such prophylactic or preventive measures as the application of chemicals to the teeth for the prevention of dental caries when such measures are authorized by regulations of the State Board of Dental Examiners."

In Vermont dental hygienists have been authorized to apply topical sodium fluoride or other approved chemicals for caries control under the supervision of a licensed dentist.

In Utah dental hygienists may be licensed to teach dental hygiene.

In Washington professional licensees are prohibited from accepting rebates and commissions or from paying the same in connection with referral of patients. Licensees practicing as copartners are excluded from the terms of the act.

COUNCIL ACCEPTS PRODUCT FOR CLINICAL TRIAL

THE Council on Dental Therapeutics announces the acceptance of DyBasik Tooth Powder for clinical trial.[1]

DyBasik Tooth Powder: Composition: Each 100 Gm. is stated to contain dibasic ammonium phosphate, 5.0 Gm.; urea, 3.0 Gm.; bentonite, 5.0 Gm.; soluble saccharin, 0.2 Gm.; menthol, 0.2 Gm.; calcium carbonate, precipitated (Snow Top, Light), 85 Gm.; flavors (peppermint oil, cinnamon oil, wintergreen oil, anise oil), 1.05 Gm.; and sulfocolaurate, 1 Gm. Distributed by DyBasik Laboratories, Inc., Los Angeles. Licensed by the University of Illinois Foundation.

1. Council Accepts Products for Clinical Trial. *J.A.D.A.* 37:705 (Dec.) 1948.

STATUS OF AMM-I-DENT TOOTH POWDER

EACH hundred grams of Amm-I-Dent Tooth Powder is stated to contain urea, 22.5 Gm.; dibasic ammonium phosphate, 5.0 Gm.; bentonite, 5.0 Gm.; sodium chloride, 4.0 Gm.; sodium alkyl sulfoacetate, 3.0 Gm.; precipitated calcium carbonate, 48.95 Gm.; tricalcium phosphate, 10.00 Gm.; saccharin; menthol, and wintergreen, peppermint, anise, cassia and spearmint oils. Sodium alkyl sulfoacetate is a conventional foaming detergent.

There are on the market today three principal types of ammoniated tooth powders, all of which contain urea in various amounts, and some of which contain dibasic ammonium phosphate. Amion Tooth Powder[1] contains urea and a urease-containing vegetable preparation. Amurol,[2] DyBasik[3] and Bi-On[4] tooth powders contain 3.0, 3.0 and 3.5 per cent, respectively, of urea and 5 per cent of dibasic ammonium phosphate. Amm-I-Dent Tooth Powder contains 22.5 per cent of urea and 5 per cent of dibasic ammonium phosphate. The Council has already published information with regard to all of these products except Amm-I-Dent, which is the subject of this report.

Evidence concerning the effect of Amm-I-Dent on oral flora is not available to the Council.

Recent lay advertising for Amm-I-Dent includes claims with reference to the prevention of dental caries. These

1. Council on Dental Therapeutics, American Dental Association, Preliminary Comment on Amion Tooth Powder. *J.A.D.A.* 38:145 (Jan.) 1949.

2. Council on Dental Therapeutics, American Dental Association, Council Accepts Products for Clinical Trial (Amurol Tooth Powder). *J.A.D.A.* 37:705 (Dec.) 1948.

3. Council on Dental Therapeutics, American Dental Association, Council Accepts Product for Clinical Trial (DyBasik Tooth Powder). *J.A.D.A.* 38:642 (May) 1949.

4. Council on Dental Therapeutics, American Dental Association, Preliminary Comment on Bi-On Tooth Powder. *J.A.D.A.* 37:246 (Aug.) 1948.

are based on the results of a controlled clinical study involving altogether 170 test subjects and 50 controls; a total of 220 adult private patients.[5] In the course of 34.3 months, the DMF rate decreased in 82 out of 100 of the test patients and increased in the remaining 18 patients. Home care was not supervised directly and the patients were aware that they were using a dentifrice which was thought to have therapeutic value.

The evidence that ammoniated dentifrices may aid in the prevention of dental caries when they are used properly should not be ignored, and further research to determine their actions and uses should be encouraged. The Council has been informed that a clinical study of the effects of a dentifrice containing 22.5 per cent of urea and 5 per cent of dibasic ammonium phosphate is to be conducted at the Central School in Mahopac, New York, utilizing approximately 500 children. The Council has not been informed of all the essential details of the study.

Amm-I-Dent Tooth Powder is not acceptable to the Council on Dental Therapeutics for clinical trial because its effects on the flora of the mouth are not adequately known and advertising claims that it will aid in the prevention of dental caries are not, in the opinion of the Council, supported by adequate evidence.

As a matter of general policy, all decisions of the Council are subject to revision in the light of new scientific evidence.

5. Henschel, C. J., and Lieber, Leon, Relative Efficacy of 27.5 per cent Ammonium Therapy Dentifrice. *J. D. Res.* 27:714 (Dec.) 1948.

COUNCIL LISTS PRODUCTS FOR "ACCEPTED DENTAL REMEDIES"

THE Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following products in the list of Accepted Dental Remedies:

Anesthetics—Local[1]

Procaine HCl 2%, Epinephrine 1:50,000: Composition: See Exodontia Products Co. (*A.D.R.*, ed. 14, p. 51).

Procaine HCl 4%, Neo-Synephrine HCl 1:3,500: Composition: See Exodontia Products Co. (*A.D.R.*, ed. 14, p. 51). Distributed by Nowak Dental Supplies, New Orleans.

Procaine HCl 2%, Neo-Synephrine HCl 1:2,500: Each cubic centimeter is stated to contain procaine hydrochloride, 0.02 Gm.; neo-synephrine HCl, 0.0004 Gm.; sodium chloride, 0.0045 Gm.; sodium bisulfite, 0.002 Gm.; in distilled water. Marketed in cartridges, 2.3 cc.

Procaine HCl 4%, Epinephrine 1:65,000: Each cubic centimeter is stated to contain procaine hydrochloride, 0.04

1. *A.D.R.*, ed. 14, p. 39.

Gm.; epinephrine, 0.0000154 Gm.; sodium chloride, 0.0045 Gm.; sodium bisulfite, 0.002 Gm.; in distilled water. Marketed in cartridges, 2.3 cc.

Procaine HCl 4%, Neo-Synephrine HCl 1:2,500: Each cubic centimeter is stated to contain procaine hydrochloride, 0.04 Gm.; neo-synephrine HCl, 0.0004 Gm.; sodium chloride, 0.0045 Gm.; sodium bisulfite, 0.002 Gm.; in distilled water. Marketed in cartridges, 2.3 cc. Distributed by Graham Chemical Co., Jamaica, N. Y.

Antibiotics and Antiseptics[2]

Pen-Troches, 1,000 Units: Stated to contain crystalline penicillin potassium, calcium stearate, sugar and flavor. In bottles of 25.

Pen-Troches, 5,000 Units: Stated to contain crystalline penicillin potassium, calcium stearate, sugar and flavor. In bottles of 25. Distributed by Cutter Laboratories, Berkeley, Calif.

Fluorine-Containing Substances[3]

Sodium Fluoride Solution 2%: A 2 per cent w/v solution of sodium fluoride in distilled water. Distributed by King's Specialty Company, Ft. Wayne, Ind.

Admission to *Accepted Dental Remedies* means that the product was found to conform to the rules of the Council when it was accepted. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcomed.—*Donald A. Wallace, Secretary.*

2. *A.D.R.*, ed. 14, p. 59.
3. *A.D.R.*, ed. 14, p. 70.

COUNCIL REPORTS ON STATUS OF CYL-DENT

CYL-DENT is a toothpaste which has been widely advertised in the eastern United States during recent months. The following claims are made in a package insert:

> CYL-DENT is guaranteed to whiten and add lustre to your teeth in one single brushing. . . . CYL-DENT is guaranteed to be the most effective agent for correcting bleeding and unhealthy gums. . . . CYL-DENT is not a bleach nor does it contain any abrasive.

Samples of Cyl-Dent supplied by the distributor have been examined in the American Dental Association Bureau of Chemistry. The product has been found to contain about 46 per cent of solids slightly soluble in water or methyl alcohol, about 22 per cent of glycerol, about 5 per cent of soap and 27 per cent of material volatile at 100 C. The latter would include the water and the more volatile flavoring agents if any were present. A magnesium compound equivalent in magnesium content to about 7 per cent of magnesium hydroxide, and calcium carbonate which was found to constitute about 36 per cent of the product, are included in the figure for slightly soluble solids. All percentages are by weight. The pH value of the paste mixed with 3 parts by weight of distilled water was found to be 10.4 at 22 C. No significant quantity of sugar or starch was present. The product did not pass the glass scratch test.

In a letter addressed to a dentist, the

firm states, "Cyl-Dent contains sodium undecylenate balanced in a mildly alkaline milk of magnesia base." Sodium undecylenate, which is a soap, is the sodium salt of undecylenic (hendecenoic) acid. There are many undecylenic acids, all of which have the general formula $C_{10}H_{19}COOH$, in which $C_{10}H_{19}$ is an alkylene group. For example, normal sodium undecylenate would be CH_2:-$CH(CH_2)_8COONa$. The characteristics of the soap in Cyl-Dent were found to be consistent with those of sodium undecylenate.

Undecylenic acid and some of its salts have been used in the treatment of various fungous infections, especially dermatophytoses, such as "athlete's foot."[1]

The only clinical evidence in support of Cyl-Dent is provided by two physicians, who signed a letter which reads in part:

> Several hundred patients were observed who have been on this product for a period up to two years. The following observations have been made:
>
> 1. Has stopped 70 per cent of unselected cases of gingival bleeding in seven to ten days.
> 2. Rapidly removes tobacco and other surface stains.
> 3. Imparts an immediate lustre and whitening (superior cleansing) effect on the teeth.
> 4. The paste is akaline [sic], non-abrasive, and non-toxic.

The information thus far available indicates that Cyl-Dent is not more than an ordinary toothpaste. There is no apparent reason to believe that it has therapeutic value or superior cleansing or polishing qualities. It contains an abrasive, namely, calcium carbonate.

The Council on Dental Therapeutics does not consider dentifrices with a view to acceptance unless there is convincing evidence of at least potential therapeutic value.

1. Osol, Arthur, and Farrar, G. E., *The Dispensatory of the United States of America*. Philadelphia: J. B. Lippincott, 1947, p. 1637.

COUNCIL REPORTS ON STATUS OF BUCKLEY PRODUCTS

According to information received from the distributors, the Buckley products are:

Acid Phenolsulfonic. An aqueous solution containing 80 per cent by weight of phenolsulfonic acid. It contains less than 4 per cent of free sulfuric acid.

Benzocaine Paste with Thymol Iodide and Urea. Each 100 Gm. contains benzocaine, 15 Gm.; thymol iodide, 20 Gm.; urea, 5 Gm.; white petrolatum, 50 Gm., and white mineral oil, 10 Gm. This product was called Benzocaine Paste in 1938.

Dental Glycerite. Each 100 cc. contains zinc phenolsulfonate, 4.6 Gm.; potassium iodide, 5 Gm.; iodine, 6.48 Gm.; menthol; thymol; glycerin, and water.

Dental Liniment. Each 100 cc. contains menthol, 2.2 Gm.; iodine, 2.2 Gm.; chloroform, 18.8 cc., and tincture of aconite.

Eucalyptol with Menthol and Thymol. Each 100 cc. contains menthol, 3.1 Gm.; thymol, 4.3 Gm., and eucalyptol. This product was called Eucalyptol Compound in 1938.

Formocresol. Each 100 cc. contains cresol, 35 cc.; formaldehyde solution, 50 cc., and glycerin, 15 cc.

Paraformol Paste. Each 100 Gm. contains paraformaldehyde, 34.4 Gm.; thymol, 5.5 Gm.; piperocaine ("Metycaine"), 5 Gm.; filter base fiber; calcium sulfate; lamp black, and petrolatum.

This product was called Paraform Paste in 1938.

Phenol, Menthol and Camphor. Each 100 cc. contains phenol, 69 Gm.; camphor, 16 Gm.; menthol, 8 Gm., and water. This product was called Phenol Compound in 1938.

Zinc Oxide-Resin Compound. Each 100 Gm. contains zinc oxide, 50 Gm.; powdered rosin, 45 Gm.; thymol iodide, 3 Gm., and thymol, 2 Gm. In 1938, this product was called Zinc Compound.

Zinc Oxide Compound, Special. Each 100 Gm. contains Zinc Oxide-Resin Compound, 89.5 Gm.; paraformaldehyde, 10 Gm., and insoluble pink pigment, 0.5 Gm. (Submitted to the Council in 1940.)

Zinc Oxide Compound, Liquid. Consists of equal parts (by volume?) of ethyl alcohol and clove oil. (Information received in 1940.)

All but the last two of these preparations were considered by the Council in 1938. At that time the Council offered to accept Acid Phenolsulfonic, Benzocaine Paste, Dental Liniment and Phenol Compound, subject to minor provisions relating to composition, labeling and advertising. The Council offered to accept Formocresol and Zinc Compound as they were then marketed. Consideration of Dental Glycerite and Paraform Paste was postponed pending clarification of their actions and uses, and Eucalyptol Compound, an unessential modification of eucalyptol, was not accepted.

The firm was unwilling to make any of the suggested changes in their labeling or advertising at the time because they had just prepared new printed matter which they felt was adequate. The firm did not provide the additional information requested by the Council concerning the composition of their products. Further, the firm insisted that their products be considered on an all-or-none basis. The firm's statement was:

> We could comment on each item in your last report but are not encouraged to do so, for we repeat that the time has arrived in our negotiations when it will be necessary that the Buckley line of dental products, as recently revised and placed on the market by us, be accepted by the Council or not as they see fit.

The Council and its staff had been working with the manufacturers and distributors of the Buckley products for several years prior to 1938, in an effort to bring the products and the marketing methods into line with professional standards, and much had been accomplished. The decision of the firm in 1938 was regretted by the Council.

During 1939 and 1940, active negotiations with the firm were continued. In July of 1939, the firm supplied much of the necessary information concerning the composition of their products and cited further evidence in support of the claims for them. The firm stated that they appreciated the Council's position relative to Eucalyptol Compound. In 1940, the names of the products were modified where necessary to conform to the provisions of the federal Food, Drug and Cosmetic Act of 1938.

Zinc Oxide Compound, Special, was submitted to the Council in November 1939. At the same time, a statement of composition for Zinc Oxide Compound, Liquid, was given. Zinc Oxide Compound, Special, contained 10 per cent of paraformaldehyde and was advocated for use in desensitizing hypersensitive dentin and to sterilize old root canal fillings.

The Council voted that consideration of Zinc Oxide Compound, Special, be postponed for six months in order to allow the firm time to establish its safety and dosage and to select an acceptable name. The Council is not yet convinced of the safety of the preparation or of the desirability or effectiveness of its use in attempts to sterilize old root canal fillings.

In the preparation of the foregoing

report on the Buckley products, only the essentials have been included. During the period from 1935 to 1940, inclusive, there was much correspondence and other discussion which does not affect the current status of the products.

The Council will be pleased to give further consideration to the Buckley products and to any evidence which may come to its attention concerning their properties, actions and uses in dentistry. At present, none of them are accepted.

COUNCIL ON HOSPITAL DENTAL SERVICE

SIXTY HOSPITAL DENTAL DEPARTMENTS GRANTED CERTIFICATES OF APPROVAL

At the American Dental Association meeting held in September 1948, the Hospital Dental Service Committee was changed to the Council on Hospital Dental Service. The new Council consists of Edward C. Dobbs, chairman, W. Harry Archer, Stephen P. Mallett, Timothy A. Hardgrove and Russell A. Sand.

As all of the Committee records were on file in the office of the secretary, J. Frank Hall, of Indiana University School of Dentistry, he was appointed as acting secretary for the transitional period.

Practically all states have a hospital dental service committee in their state association. Members of these committees have been asked to serve as examiners of hospital dental departments within their jurisdiction. Their cooperation is greatly appreciated.

Throughout the United States many new hospitals are under construction; old established hospitals are expanding and reorganizing to meet the increasing demands for hospitalization. All the plans for expansion provide for increasing the space and personnel of the dental department in accordance with the basic standards for hospital dental service as set up by the American Dental Association.

The basic standards provide for six sections in the department of dentistry, and recommend that each hospital establish as many sections as are necessary to provide adequate dental service in the particular hospital. The recommended sections in the department of dentistry are: (1) oral surgery, (2) dentistry for children, (3) restorative dentistry, (4) periodontics, (5) dental roentgenology, (6) oral pathology.

In order to qualify for a certificate of approval, the hospital should consider the basic standards as set up by the Committee on Hospital Dental Service and adopted by the House of Delegates of the American Dental Association. These standards, known as *Basic Standards of Hospital Dental Service Required of Approved Hospitals,* have been approved as a recommendation for the department of dentistry in all hospitals by the following groups of the American Hospital Association: the Council on Professional Practice, the Coordinating Committee and the Board of Trustees.

Hospital personnel considering certification for their department of dentistry should acquaint themselves with the basic standards, a copy of which may be obtained from the secretary of the Council.

Some of the cardinal requirements for certification are:

1. The title of the department responsible for the hospital dental service should be "The Department of Dentistry" or some similar title containing the word dentistry or dental, consistent with those used for divisions of service within the given hospital.

2. The department of dentistry should have autonomy and be organized under the direction of a dentist.

3. Paitents hospitalized primarily for the treatment of oral conditions should be admitted in the name of a dentist and on the dental service.

4. The space allotted to the department of dentistry and the equipment, instruments and supplies of the department should be adequate for such services as may be needed in accordance with generally accepted standards of practice.

5. The dental staff should be sufficient in number and qualification to maintain an adequate dental service and train junior staff members.

The following excerpts are reprinted from a report of the Commission on Hospital Care[1] for the information and guidance of members of the dental profession interested in hospital dental service.

Dental Staff: Some of the large metropolitan general hospitals have dental staffs consisting of senior and junior men together with residents and interns. Some of the smaller general hospitals appoint dental consultants who are called when the need arises. Many of the hospitals for pulmonary tuberculosis, for nervous and mental disease (particularly State institutions), and for chronic disease employ full-time dentists to treat the various dental conditions. It is recommended that:

21. A dental service should be established whenever competent dentists are available and willing to practice in the hospital.

In recent years, the facilities of general Hospitals have been more widely utilized for diagnostic purposes. A physical examination is not complete without a careful study of oral conditions. Concern has been expressed at the lack of a dental service, particularly when there is indication that the condition of the teeth plays an important role in the illness under observation. Occasionally important considerations in the cause of illness are overlooked because of failure to study the teeth and oral areas. It is proposed that:

22. Dental examinations, directed toward the discovery and diagnosis of dental and oral infections which may be related to systemic disease, should be made of all patients admitted to hospitals except when the physician in charge pronounces this procedure unnecessary or impractical.

Dental service in general hospitals varies, but as a rule it is limited to diagnosis and treatment of diseases and injuries of the mouth and adjacent parts. It usually includes the treatment of acute and chronic oral infections, the extraction of teeth, the removal of benign tumors, and the care of such injuries as fractures of the teeth, jaws, and facial bones. Consultations with other members of the medical staff are provided. Ordinarily no prosthetic work, such as fillings and restorations, is performed. In special hospitals, however, complete dental care is frequently provided. It is recommended that:

23. The dental service in a hospital should include ordinary prosthetic dental procedures only when patients are in long residence. Its primary objective should be the elimination of dental infections, especially those bearing a relation to systemic disease. The surgical measures that are undertaken should be limited to those procedures upon which surgical and dental staffs agree.

The addition of dentists to the medical staff of a hospital creates organizational problems. The dental staff functions in a field which, although specialized, is nevertheless related to the general medical program. As such, the dental staff must be given identity. Its work and plans must be coordinated with other branches of the medical care program. The manner in which the medical staff is organized and the manner in which the dental staff functions as a staff unit will determine the method of its organization. It is suggested that the dental service be organized in one or another of the following ways:

24. a. As a separate division of the medical staff with patients admitted directly to the dental service;

1. Commission on Hospital Care, *Hospital Care in the United States*. New York: The Commonwealth Fund, 1947, p. 74.

b. As a separate division of the medical staff but with the dental staff acting in the capacity of consultants to or sharing responsibility for the care of patients with other members of the medical staff; or

c. As a section or division of the surgical department of the medical staff with the dental staff acting as consultants to the surgical staff and sharing with them the responsibility for the care of patients.

[Only paragraph *a* meets the basic requirements for approval of dental departments by the American Dental Association.]

When physicians who have both medical and dental training are available, they are frequently appointed as maxillofacial or oral surgeons on the hospital staff and have responsibility for the major surgical problems in this field. However, much of this work can be done by competently trained dentists who hold only a dental degree. In the organization of the dental staff, it is recommended that:

25. The chief of the dental service preferably should be a person trained in general surgical technique and competent as an oral surgeon. The service should be so organized and controlled that only members of the staff who are of proven competence are permitted to perform surgical procedures.

Up to March 10, the dental departments of 62 hospitals had been examined. Sixty of these have been approved and have received the certificate of approval from the Council on Hospital Dental Service of the American Dental Association.

The dental departments of 2 hospitals have been provisionally approved. Suggestions have been made for changes that would bring these departments into conformity with the basic standards. When all requirements are met, these departments will be given full approval and a certificate will be sent to them.

The hospitals whose dental departments have been approved are:

Connecticut

Norwich State Hospital, Norwich
R. H. Guthrie, Superintendent
E. C. Kirby, Chief of Dental Department

The Hartford Hospital, Inc., Hartford
W. M. Allen, Director
W. R. Conran, Director of Dental Department

Illinois

The Carle Foundation and Carle Memorial Hospital, Urbana-Champaign
R. H. Duncan, Superintendent
E. C. Thompson, Chief of Oral Surgery

University of Chicago Clinics, Chicago
R. E. Brown, Superintendent
J. R. Blayney, Chief of Dental Service

Indiana

The Indianapolis General Hospital, Indianapolis
C. W. Myers, Superintendent
J. T. Waldo, Chief of Dental Staff

Kansas

University of Kansas Medical Center, Kansas City
C. B. Newell, Administrator
R. W. Edwards, Chief of Dental Staff

Massachusetts

The Boston City Hospital, Boston
J. W. Manary, Superintendent
S. P. Mallett, Chief of Dental Staff

The Children's Hospital, Boston
G. W. Brugler, Administrator
P. K. Losche, Chief of Division of Dentistry

Massachusetts General Hospital, Boston
N. W. Faxon, Director
K. H. Thoma, Chief of Dental Department

Worcester City Hospital, Worcester
H. K. Spangler, Superintendent
L. A. Storz, Chief Oral Surgeon

Maryland

Baltimore City Hospital, Baltimore
P. J. McMillin, Superintendent
H. G. Waring, Acting Chief of Dental Service

Sinai Hospital of Baltimore, Inc., Baltimore
H. H. Weiss, Executive Director
M. K. Baklor, Chief of Dental Department

New Jersey

Monmouth Memorial Hospital, Long Branch
C. B. Allen, Administrator
L. Reisner, Chief of Dental Department

New Jersey State Hospital, Trenton
J. B. Spradling, Medical Director
F. J. Fischer, Director of Dental Department

Jersey City Medical Center, Jersey City
G. O'Hanlon, Director
F. J. Houghton, Dental Director

North Hudson Hospital, Weehawken
J. L. Evans, Administrator
M. J. Boyer, Attending Dental Chief

New York

Beth Israel Hospital, New York City
M. S. Frank, Director
I. Salman, Director of Dental Department

Bronx Hospital, New York City
A. A. Karan, Director
S. B. Gerstner, Director of Dental Department

Gouverneur Hospital, New York City
J. Sheridan, Medical Superintendent
B. Klug, Visiting Dental Surgeon

Grasslands Hospital, Valhalla
E. L. Harmon, Director
B. H. Weeth, Chief of Dental Department

Harlem Hospital, New York City
I. Magelaner, Superintendent
L. H. Fairclough, Visiting Dental Surgeon

Bellevue Hospital, New York City
W. J. Jacobs, Superintendent
W. Rosenbaum, Director Dental Department

Jewish Sanitarium and Hospital for Chronic Diseases, Brooklyn
A. Fergenbaum, Director
L. Kohn, Chief of Dental Staff

Jewish Memorial Hospital, Inc., New York City
L. Miller, Superintendent
J. Schroff, Attending Oral Surgeon

Lenox Hill Hospital, New York City
J. H. Hayes, Superintendent
F. S. Dunn, Attending Oral Surgeon

Metropolitan Hospital, New York City
I. H. Scheffer, Medical Superintendent
M. W. Carr, Director Oral Surgery

Montefiore Hospital, New York City
E. M. Bluestone, Director
D. Tanchester, Attending Dentist

New York Medical College, Flower and Fifth Avenue Hospitals, New York City
J. M. Beeler, Administrator
M. W. Carr, Acting Director Dental Department

New York Polyclinic Medical School and Hospital, New York City
J. A. Jaller, Executive Officer
E. Whynnan, Chief of Dental Department

The Jewish Hospital of Brooklyn, Brooklyn
M. Hinenburg, Executive Director
M. D. Levin, Attending Director of Dental Department

Roswell Park Memorial Institute, Buffalo
L. C. Kress, Director
H. A. Solomon, Director Dental Department

North Carolina

North Carolina Baptist Hospital, Winston-Salem
Mrs. R. T. Holmes, Administrator
J. C. Watkins, Dental Director

Ohio

Cleveland State Hospital, Cleveland
E. H. Crawfis, Superintendent
A. H. Wichert, Director Dental Department

Pennsylvania

Children's Hospital of Pittsburgh, Pittsburgh
P. H. Lantz, Superintendent
C. W. Hagan, Chief of Dental Service

Elizabeth Steel Magee Hospital, Pittsburgh
Miss J. J. Turnbull, Superintendent
W. H. Archer, Chief of Dental Department

The George F. Geisinger Memorial Hospital, Danville
W. M. Wilson, Superintendent
J. B. Smith, Director Dental Department

Guthrie Clinic, Sayre
H. E. Bishop, Administrator
G. F. Carling, Chief of Dental Service

The Jewish Hospital Association of Philadelphia
J. C. Doane, Medical Director
G. C. Tassman, Chief of Dental Service Staff

Pennsylvania Hospital, Philadelphia
J. N. Hatfield, Superintendent
J. R. Camerson, Chief of Dental Service

The Presbyterian Hospital, Pittsburgh
T. D. McCrossin, Superintendent
L. E. VanKirk, Chief of Dental Service

The Lancaster General Hospital, Lancaster
R. B. Hall, Manager
C. V. Snyder, Chief of Dental Department

St. Francis Hospital, Pittsburgh
Sister M. Thomasine, Administration Head
R. G. Engler, Senior Dental Surgeon

The Western Pennsylvania Hospital, Pittsburgh
M. H. Eichenlaub, Superintendent
J. A. Gardner, Chief of Dental Department

Western State Psychiatric Institute and Clinic, Pittsburgh
G. B. Pearson, Director
W. H. Archer, Head of Dental Department

Rhode Island

State Hospital for Mental Diseases, Howard
F. F. Regan, Superintendent
L. C. England, Resident Dentist

U. S. Army

Brooke General Hospital, Fort Sam Houston, Texas
P. H. Streit, Medical Officer
W. C. Caldwell, Dental Chief

Letterman General Hospital, San Francisco, California
D. F. Winn, Commanding Officer
B. L. Smith, Chief of Dental Service

Oliver General Hospital, Augusta, Georgia
O. H. Stanley, Commanding Officer
H. G. Ott, Chief of Dental Service

Percy Jones General Hospital, Battle Creek, Michigan
R. M. Hardaway, Commanding Officer
J. H. Pence, Chief of Dental Service

Fitzsimons General Hospital, Denver, Colorado
O. H. Quade, Commanding General
O. P. Snyder, Chief of Dental Service

Walter Reed General Hospital, Washington, D. C.
G. C. Beach, Jr., Commanding Officer
W. F. Scheumann, Chief of Dental Service

U. S. Navy

U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md.
M. D. Willcutts, Medical Officer in Command
L. D. Mitchell, Jr., Dental Officer in Command

U. S. Naval Hospital, Annapolis, Md.
O. D. King, Medical Officer in Command
E. J. Jerden, Chief of Dental Staff

U. S. Naval Hospital, Philadelphia, Pa.
H. H. Montgomery, Medical Officer in Command
C. F. Hoyt, Chief of Dental Service

U. S. Naval Hospital, Newport, R. I.
L. Hart, Medical Officer
A. Knox, Chief of Dental Service

U. S. Naval Hospital, St. Albans, Long Island, N. Y.
W. D. Small, Medical Officer in Charge
M. M. Maxwell, Chief of Dental Service

U. S. Naval Hospital, Guam, M. I.
D. J. Wharton, Medical Officer in Command
W. Seidel, Senior Dental Officer

U. S. Naval Hospital, San Diego, California
F. R. Hook, Medical Officer in Command
A. R. Long, Chief of Dental Service

U. S. Naval Hospital, Great Lakes, Illinois
J. T. Hooker, Medical Officer in Command
T. V. Joseph, Chief of Dental Service

U. S. Public Health Service

U. S. Marine Hospital, Staten Island, New York
T. B. H. Anderson, Medical Officer in Charge
R. H. Moore, Chief, Dental Service

An application blank and copy of the *Basic Standards of Hospital Dental Service Required of Approved Hospitals* may be obtained by writing to the acting secretary of the Council, J. Frank Hall, D.D.S., Indiana University School of Dentistry, Indianapolis 2.

THE Journal OF THE
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LON W. MORREY, D.D.S., *Editor*

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EDITORIALS

PROPOSED POSTAL RATE INCREASE: A NEW LEVY ON PUBLIC INFORMATION

DENTAL and other scientific and educational publications will be faced with a serious problem if H.R. 2945, a bill sponsored by the administration, should receive favorable congressional consideration. Introduced by Representative Tom Murray, Tennessee, H.R. 2945 is intended to place the postal service on a self sustaining basis. The bill proposes to do this largely by increasing second class postage rates. A companion bill, S. 1103, has been introduced into the Senate by Senators Olin D. Johnston, South Carolina and William Langer, North Dakota.

Government subsidy of second class postage has been in effect for more than 100 years. It was designed for the specific purpose of stimulating the dissemination of scientific, educational and religious information to the public—a federal contribution to the cultural advancement of the nation. If the present bill were passed, this legislation would destroy the very purpose for which second class postage was intended.

For years dental publications, like publications of other not-for-profit organizations, have enjoyed the advantages of second class mailing. The passage of H.R. 2945 will destroy this advantage, force many of the smaller dental publications out of existence and compel others to raise their subscription rates. The mailing cost of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, for example, would be increased almost 600 per cent.

Under the present law THE JOURNAL is mailed as a scientific publication at a rate of .015 cents a pound, regardless of domestic destination. Under the proposed bill, THE JOURNAL and publications of all other scientific and educational organizations would be given no preferential rating, but would be required to pay postage on a sliding scale which would be related to postal zones and the percentage of pages

devoted to advertising. Publishers of national, state and component dental society journals would be compelled to pay the same rate as commercial publications.

The current annual mailing cost of THE JOURNAL, amounting to $9,420, would be raised immediately under the new bill to $42,600, an increase of 452 per cent. However, this is not final, as the bill provides that after one year the rate would be increased 50 per cent, making the ultimate mailing cost of THE JOURNAL $63,900, an increase of 578 per cent. In addition to the increase in second class postage, the bill provides for an increase in charges for notices of change of address.

The Council on Legislation will protest the passage of this bill in its present form. If postal rates must be raised to meet the constantly increasing costs of governmental operations, they should be increased within reason. If this bill is passed the profession will be denied much of its opportunity of acquiring information on the latest scientific developments in dentistry. Of equal importance, the public will be deprived of an established means of acquiring information on all scientific and cultural subjects.

The impact of the proposals in H.R. 2945 will fall as heavily on publications of state and component dental societies as they will on publications of the Association. Every constituent and component dental society should study carefully the provisions of this bill, determine its implications for their publication and register protests to their representatives in Washington.

The Hoover Commission has recommended certain proposals for the reorganization of the Post Office which would effectuate as great a saving as is promised by the proposed increase in second-class rates. Let those proposals be fully explored by Congress before it adopts measures that will tend to restrict the dissemination of scientific and cultural literature. The provisions incorporated in H.R. 2945 definitely are inimical to the public interest.

"GERIODONTICS": DENTAL CARE FOR THE ELDERLY

MAN'S successful efforts to extend life expectancy have been so recent and the results so rapid that society as yet is not attuned to its import. In general, the problem created by aging of the population is new, and the situation which it creates is without precedent. "Never before in the history of mankind has a like problem presented itself."[1] According to the United States Bureau of Census,[2] only 4 per cent of the population in 1900 was over 65 years of age. By 1940 this percentage had risen to 6.4, and it is estimated that it will increase to 14.2 by 1980.

The success of science in prolonging human life places an added responsibility on the health profession—the responsibility of making life livable for the aged. "The society which fosters research to save human lives cannot escape responsibility for the life thus extended. It is for science not only to add years to life, but more important to add life to years."[3] Certainly modern dental science can add life to the years of the aged and in many instances can prolong life itself.

Formerly, when life expectancy was much lower, chronic diseases were less

prevalent. Quite probably periodontal disease, buccal neoplasms and the accumulated effects of dental caries were not so common as they are today. While it is recognized that the prevalence of caries decreases with age, the sequelae of caries, attrition and neglect burdens the elderly with edentulous mouths or with periodontal disease, reduced masticatory surfaces and impaired bite strength, all of which contribute to the aging process.

O'Rourke,[4] in his article "Significance of Tests for Biting Strength," published in this issue, discusses one factor in geriodontics that has been given little previous consideration: the influence of pain on masticatory habits with resultant deleterious effects on health. "Inflammation is one of the most common and significant factors in reducing tolerance to masticatory stress. . . . It does not matter whether the inflammatory reaction is due to local or systemic causes. The effects in lowering the pain threshold, and thus reducing the tolerance to masticatory stress, are the same." To avoid the discomfort of painful mastication the patient changes either his diet or his swallowing habits. If he changes his diet he substitutes soft carbohydrate foods for proteins, which results in an imbalanced diet. If he changes his swallowing habits he swallows larger and coarser food masses, which throws additional work on an aging stomach and contributes to gastrointestinal disorders. Imbalanced diets, gastrointestinal disturbances, improper mastication and the absorption of products of infection from diseased dental tissues all contribute their quota to the aging process. It is dentistry's responsibility to reduce that quota.

The best method of assuring the elderly of a comfortable and efficient dentition is by regular dental attention during youth. However, even if this ideal became a reality, there still would remain thousands who would require special geriodontic service. Certainly the problem created by an aging population re-emphasizes the need for creating a long range dental health program to conserve natural teeth in a healthy condition, plus more intense study of the dental problems peculiar to an aging population—a program that not only will help to prolong life but will add to the comfort, health and usefulness of the elderly.

1. Steiglitz, E. S., The Potentialities of Preventive Geriatrics. *New England J. Med.* 225:248 (Aug.) 1941.
2. U. S. Bureau of Census—1940 Census.
3. Piersol, G. M., and Bortz, E. L., The Aging Process: A Medical-Social Problem. *Ann. Int. Med.* 17:964 (Jan.) 1939.
4. O'Rourke, J. T., Significance of Tests for Biting Strength. *J.A.D.A.* 38:627 (May) 1949.

THE 1949 ANNUAL SESSION

OCTOBER 17 to 20

THE ninetieth annual session of the Association, which will be held in San Francisco October 17 to 20, has been streamlined from the customary five to a four day meeting. The Council on Scientific Sessions reports that plans are well under way for all aspects of the scientific program which, including the section meetings, scientific and technical exhibits and motion picture program, will be held in the Municipal Auditorium. The Fairmont Hotel in which the House of Delegates will meet and the Mark Hopkins Hotel have been designated convention headquarters.

San Francisco, while a great convention city, does not have the enormous hotels found in many of the eastern cities, but it does have a large number of smaller and medium sized hotels, ideally located in relation to the Municipal Auditorium, which will provide conventioners with satisfactory accommodations.

In accordance with the policy established three years ago, all applications for hotel reservations will be handled by the housing bureau. A reservation form for hotel accommodations is published on pages A-24 and A-25 of this issue. All members and others who plan to attend are urged to fill out and return this form to the bureau immediately. Reservations will be filled in the order in which they are received so it will pay to act promptly.

CLOSING THE RANKS:

THE NATIONAL PHYSICIANS' COMMITTEE LIQUIDATES

THE National Physicians' Committee for the Extension of Medical Service has announced that its existence was terminated on April 1 and that final liquidation procedures will be determined at a meeting in June. This decision on the part of the board of trustees of the committee will be hailed in many quarters as one based on sound judgment, for it removes from the scene an agency which has played a role of indeterminate value in the health professions' fight against compulsory health insurance.

Few persons disagreed with the committee's position that the federalization of health service was undesirable. Many disagreed strongly with the methods used by the committee to make its position plain. This division of opinion provided a vulnerable target of considerable size for the ever-zealous proponents of government health service. It did not contribute to the needs of the day which are unity of the health professions and unity within the health professions.

The National Physicians' Committee and its subsidiary, the National Committee of Dentists, undeniably enlisted the aid of many physicians and dentists who were sincerely interested in preventing the enactment of inimical health legislation. Their efforts should now be continued and intensified under the expanding programs of organized dentistry and organized medicine.

The time to close ranks is now. The proponents of federal medicine and dentistry will use every ruse to hide the fallacies and emptiness of their promises. Under the constructive leadership of the professions, millions of citizens can be taught that the way of federal compulsory health insurance is not the way to health for this nation.

A BIOLOGICALLY ACTIVE SALIVARY FRACTION POSSIBLY RELATED TO CARIES SUSCEPTIBILITY

T. J. Hill, D.D.S., B. White, B.S., M. Matt, D.D.S. and S. Pearlman, D.D.S., Cleveland

SALIVA has been fractionated and a portion obtained which may be an influence in dental caries susceptibility. The extract has been recovered in quantities of from .01 to .04 mg. per milliliter of saliva. In these preliminary extractions, larger amounts have been recovered from the saliva of persons resistant to dental caries. This extract inhibits the growth of certain bacteria; when injected into animals, it produces a prolonged hyperglycemia which suggests that its action may be the interference with carbohydrate metabolism.

When added to whole fresh saliva, it retards the rate of acid production. When incorporated in dextrose broth, the rate of growth of Lactobacillus acidophilus is in inverse relation to the amount added. Two milligrams of extract per milliliter of broth completely stops the growth of lactobacilli. Smaller amounts suppress the growth for periods of 24 to 48 hours.

Figure 1 is a graphic representation of the multiplication of Lactobacillus acidophilus 4646 when inoculated into dextrose broth containing various amounts of the extract.

In the preliminary study of the effect of the salivary extract on the carbohydrate metabolism of animals, eight rats were employed. Four normal glucose tolerance curves were established for each rat. These curves were of the same shape and did not vary more than 7 per cent from the average tolerance curve for each rat.

Injection of salivary extract increased the peak of the glucose tolerance curve above that which could be explained on the basis of fright reaction to the injection. The return of the blood sugar level to normal was delayed (Fig. 2).

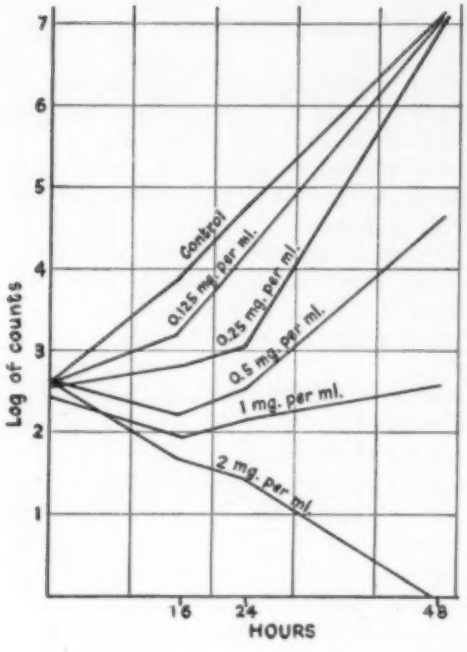


Fig. 1.—Growth of Lactobacillus acidophilus in dextrose broth containing indicated amounts of the salivary extract

Western Reserve University.

Further studies will include consideration of dosage, oral administration, the effect of varied fasting periods, repeated injections, relation to insulin and relation to caries-susceptibility.

The nature of the material has not yet been determined. It is known to be soluble in water but insoluble in alcohol or ether. It is thermo-stable and not dializable. Efforts to identify the material are now being made. The results of these investigations and the method of extraction will be published subsequently.

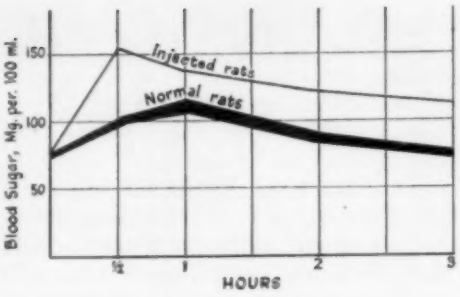


Fig. 2.—Glucose tolerance curve for 8 normal rats and for the same rats after injection with the salivary extract

▲

Dermatitis From Rubber Gloves

To the Editor:—Of two types of surgeons' gloves commonly used in hospitals—latex gloves and the cement type of gloves—the former is made from pure gum latex imported in liquid form, while the second type is made from high grade Para rubber from Brazil imported in the form of smoked sheets. A larger percentage of hospitals are using the cement type of glove rather than the latex glove, despite the fact that comparative tests show the latex glove to be the superior in tensile strength, elongation and resistance to aging. The preference for the cement type glove appears based on the idea that latex produces a greater incidence of allergic reactions among surgeons and nurses. Our investigations of this subject have not revealed any reliable proof for this assumption. Do you know of any studies which have been made on the two types of gloves to show the relative sensitiveness of skin when in contact with them? We believe that hospitals could save money by purchasing latex gloves and feel that such a recommendation should be made provided that there is no scientific proof that a pure latex gum glove is more hazardous.—Hospital Bureau of Standards & Supplies, Inc., New York.

Answer.—Reports of studies on the incidence of dermatitis from latex gloves as compared with cement (dipped) gloves are not available. The problem of preventing dermatitis from rubber gloves is not always as simple as the substitution of latex gloves for dipped gloves, or vice versa.

Gloves may be made from natural rubber and natural rubber latex or from the synthetic rubbers and synthetic rubber latex. There are many types of synthetic rubbers differing widely in chemical composition. Buna S is a copolymer of styrene and butadiene. Buna N is a copolymer of styrene and acrylonitrile. Neoprene G.R.N. is polymerized chlorobutadiene, and there are several other types of synthetic rubbers. Dermatitis from synthetic rubbers is more frequent than from natural rubber.

Many accelerators, antioxidants, plasticizers and other chemicals are added to all rubbers to make them suitable for gloves, and they differ in chemical composition. They are the most frequent causes of dermatitis. Rubber goods are often cured or vulcanized by exposure to the vapors of sulfur monochloride instead of to heat, and the compounds continuously being formed on the surface of vapor-cured (acid-cured) rubber may cause dermatitis. There is no one cause of dermatitis from wearing rubber gloves.

For further discussion of the subject, you may refer to: Schwartz, L.; Tulipan, L., and Peck, S. M.: Occupational Diseases of the Skin, Philadelphia, Lea and Febiger, 1947, pp. 495-517, and Schwartz, L., and Pack, S. M.: Dermatitis from Wearing Apparel, *J.A.M.A.* 128:1209-1217 (Aug. 25) 1945.—*J.A.M.A. 139:129 (Jan. 8) 1949.*

INTERNATIONAL CORRESPONDENCE

NEWS FROM BRITAIN

The Ministry of Health has issued the conditions of service for dental specialists in hospitals and it is gratifying to note that they are ranked on a par with medical specialists in all conditions of service and remuneration. It is not expected that many dentists will be graded as specialists for as far as can be ascertained oral surgery, orthodontics and advanced prosthetics will be the main dental specialties required in the hospital service. Here, summarized, are the main points from the memorandum:

Full Time Specialists.—Specialists appointed at the age of 32 will be paid £1700 ($6,800) per annum, rising by £125 ($500) to £2,075 ($8,300), thereafter rising by £150 ($600) to £2,375 ($9,500) and from this rate by £125 ($500) increments to the maximum of £2,750 ($11,000) per annum. A specialist commencing at the age of 31 would be paid £1550 ($6,200) per annum and under 31 years of age his salary would be £1,400 ($5,600). [The Spens' Report on Specialists estimated that normally the period of training of a specialist would not be completed before the physician or dentist had reached the age of 32.]

Specialists commencing in the full time service after the age of 32 would be placed in the scale according to age, experience, qualifications and considerations of war service, but he would not be rated higher than his age entitled him to be. A specialist entering the service at 32 will be 40 when he reaches the maximum scale.

Special Distinction Awards.—An advisory committee on awards for consultants and specialists has been set up to help determine which specialists engaged in the National Health Service should receive awards for professional distinction. It is estimated that four per cent of all specialists in the service should receive the highest award of £2,500 ($10,000) per annum in addition to the basic salary. A further 10 per cent should receive the second award of £1,500 ($6,000) and a further 20 per cent the third reward of £500 ($2,000). These awards will be paid as an element of remuneration additional to the main scale and will be superannuable.

Trainee Specialist Grades.—Grade 3. Posts normally obtained not less than one year after registration and normally held for one year only carry a salary of £670 ($2,680) per annum.

Grade 2. Posts normally obtained two years after registration and held for two years, £775 ($3,100) for the first year and £890 ($3,500) for the second year.

Grade 1. Posts normally obtained not less than four years after registration and held for three years, £1,000 ($4,000) for the first year; £1,100 ($4,400) for the second year; £1,200 ($4,800) for the third year and £1,300 ($5,200) for subsequent years.

Non-Specialist Grades.—Junior House Officers: £350 ($1,400) per annum for the first post held, £400 ($1,600) for the second post held and £450 ($1,800) for any subsequent junior house post held. Each post to be tenable for six months.

Part Time Appointments.—The part time specialist will be paid according to the number of "half days" he works per week. A half day is reckoned as a period of up to three and a half hours. Over 3½ hours and up to 7 hours is calculated as two half days and so on. The duration of the time given to the hospital service in the calculation of the hours includes

out-patient clinics, ward rounds, operating sessions, laboratory work, occasional visits to outlying hospitals for consultations, diagnosis and operative work, as well as time given to "pastoral" visits to cottage hospitals. Remuneration to be paid is calculated from a formula based on the whole time salary appropriate to the specialist. Part time specialists are limited to a maximum of 9½ elevenths of the full time salary of the appropriate grade. Payment will be made separately for domiciliary visits by part time specialists but no payment will be made to whole time specialists. Whole time clinical teachers will be paid by the university and will hold honorary unpaid posts in the appropriate hospitals but will be allowed the same expenses as the part time specialists with one or two minor exceptions.

Clinical Teaching Posts.—The following revised rates of pay for full time medical and dental clinical posts (to operate not earlier than April 1): professors, £2,250 ($9,000) to £2,750 ($11,000); lecturers, £600 ($2,400) to maximum of £1,500 ($6,000) to £2,000 ($8,000). In cases of special responsibility, £2,500 ($10,000).

Pre-clinical posts (to operate not earlier than October 1): professors, £2,000 ($8,000) to £2,500 ($10,000); lecturers, £600 ($2,400) to maximum of £1,200 ($4,800) to £1,800 ($7,200). Part time specialists will be paid by the Hospital Board for their hospital work and also by the University for their clinical teaching during their hospital work.

Other provisions set out in the memorandum include remuneration for general dental practitioners who, while not specialists, do routine dentistry in the hospitals. They are to be paid at the rate of £150 ($600) per annum per weekly half day up to a maximum of £1,350 ($5,400).

Normal retiring age for those practicing under these regulations will be 65 and special provisions for appeal against termination of appointments now are available.

Length of holiday leaves are now determined on the basis of salary with four weeks alloted to those earnings less than £1,000 ($4,000) per annum and six weeks for those earning more than that amount. Sick leave is provided and progresses from the equivalent of one month's full pay to a maximum of six months' full pay and six months' half pay after ten years of service.

The recommended rates of pay will be retroactive to July, 1948 and the differences between the present rate and the new one will be adjusted to the new rate.—*John R. Boyes, Newcastle Upon Tyne.*

THE NATIONAL SCENE

from the Journal's Washington Correspondent

THE battle over what type of national health program this country shall have has now been joined. On Capitol Hill, the forces behind President Truman's renewed campaign for compulsory health insurance are girding to fight the Democratic-Republican coalition which will support federal subsidization of medical, dental and hospital care solely on a voluntary basis. Intensity of the Congressional controversy is matched by the feeling on both sides of the subject that is steadily mounting throughout the nation, as indicated by the volume of mail pouring into the Capital.

All three major national health plans are now in the arena. The last 30 days witnessed the introduction of all three. First, the bipartisan measure sponsored by Senators Hill, O'Conor and Withers (Democrats) and Morse and Aiken (Republicans), which would grant large federal sums to the states and allow them to spend the money very much as they see fit. Next came the Taft-Smith-Donnell bill, which follows the same principle but is more specific in the matter of cost. Finally, the successor to the familiar Murray-Wagner-Dingell bill, with compulsory health insurance still its backbone but now providing for aid to dental and medical education, rural health, medical cooperatives, local health departments, etc.

The Hill (S.1456) and Taft (S.1581) bills are so much alike in their philosophy that for all practical purposes there are only two camps to be considered, the pro-insurance and the anti-insurance. On April 14, when S.1581 was filed in the Senate, it was praised by Senator Morse, himself a sponsor of S.1456, as "a constructive program" which seeks to "preserve this great way of life which we call the American system." His comments came in the course of a lengthy, fervent speech on the Senate floor in which he disavowed national health insurance but criticized tactics which he said are being employed by A.M.A. and constituent societies to prevent its adoption.

Now in the hands of the Senate Labor and Public Welfare Committee, together with Hill and the Truman health bills, the Taft measure has the following provisions:

1. An independent National Health Agency is established, headed by a physician appointed by the President. It would consolidate U.S. Public Health Service, Food and Drug Administration, St. Elizabeth's Hospital (mental) and those duties of Children's Bureau concerned with maternal and child health. Its main unit would be the Office of Medical, Dental and Hospital Services, with a doctor of medicine at the head.

2. Five million dollars is authorized for state surveys of medical, dental and hospital services and facilities, public and private. States must match, 50-50, the federal funds allocated to them for surveys. From these studies will emerge the state plans for comprehensive augmentation of health services "to all families and individuals unable to pay the whole cost of such services." Federal appropriations of $1,250,000,000 are authorized, to be spread over a five-year period, to be matched by an equal total from the

states. At the state's discretion, dental services may be provided, as well as medical. Up to 25 per cent of the state's allotment may be expended for inducements to dentists and physicians to practice in low-income or doctor-short areas, strengthening of diagnostic facilities and encouragement of voluntary, nonprofit health insurance plans.

3. Thirty-five million dollars a year is provided for school health services, concentrating on preventive dental and medical care.

4. Expansion of the Hill-Burton hospital construction act, doubling the annual authorization to $150,000,000 and liberalizing the matching-fund formula.

5. Subsidization of local public health units throughout the country, with Congress to fix the amount of appropriations.

6. Creation of a 16-member commission—patterned after the Hoover Commission on reorganization of the government's executive branch—to study training facilities and manpower requirements of all of the health professions. Meantime, a three-year program of subsidization of medical schools would be inaugurated. Taft and his two Republican colleagues, in introducing S.1581, stated: "We have inserted no payments for schools of nursing, dentistry, dental hygiene or public health engineering simply because we have not available the information showing that a subsidy for these schools is absolutely essential as it appears to be from our information on schools of medicine. We are loath to suggest a federal subsidy for private educational institutions in the absence of a convincing case. We shall be glad to consider the inclusion of such schools in the temporary program if the evidence shows they are in serious difficulty."

7. This is a "miscellaneous" section of the omnibus bill which provides (1) that federal employes may, at their request, have premium payments for membership in voluntary health insurance plans deducted from their pay regularly and (2) that financing of the over-all program shall be from general revenue of the Treasury, rather than through government borrowing.

Looking over the above, it may be seen that the first title is adapted from S.545 of the previous Congress, with few changes. Number two likewise stems from the same bill. Number three is substantially the same as S.1411, the noncontroversial school health services bill sponsored and favorably reported by the full membership of the Senate Labor and Public Welfare Committee. Title four is S.614, the bipartisan bill on amendment of the Hill-Burton Act supported by Senators Hill and Ellender, Democrats, and Taft and Smith, Republicans. Number five is the same as S.522, the bipartisan local public health units bill. Number six, which is the newest feature of S.1581, was several months in preparation and reflects the increasing concern of members of Congress with the necessity of raising materially the annual output of physicians and dentists. The final title, number seven, was adapted from S.545.

"We recognize the need for federal participation in the realm of health," said a statement by Senators Taft, Smith and Donnell, "but we reject firmly the idea that the federal government should control all the funds spent, the detailed methods adopted, or the day-to-day administration of health activities in the states and localities. The primary responsibility for health rests on the local community and the individual citizens. In this bill, we ask that the federal government accept its proper constitutional-participation to the extent justified by

the lack of the ability on the part of states and local communities to do the whole job as it should be done."

Capitol Sidelights

While national health program developments commanded the greatest amount of attention, they did not monopolize the Potomac scene in April. Early in the month, separate bills on financial assistance to dental schools were taken under consideration by Senate and House committees. The measures also provide for scholarships. Their sponsors are Senator Claude Pepper (D., Fla.), and Rep. W. M. Wheeler (D., Ga.).

Norvin C. Kiefer relieved James A. Crabtree as director of the medical division, National Security Resources Board. The latter is expected to join the faculty of the new School of Public Health at University of Pittsburgh.

U. S. Public Health Service officials disclosed that a study of the financial status of the nation's dental schools probably will be undertaken after a similar survey of medical schools is completed, probably in June.

Military spokesmen disclosed that the "moral suasion" campaign for recruitment in the medical and dental corps is not bringing in the numbers required.

The House Veterans Committee, which has been preoccupied with pension legislation since the 81st Congress opened, indicated that it soon expects to reach other bills on its docket, including proposals to give dentistry professional parity with medicine in the Veterans Administration.

Rudolph H. Friedrich, of Plainfield, N. J., chairman of the A.D.A. Council on Federal Government Dental Corps, met April 18 with the dental chiefs of the Army, Navy and Air Force to discuss plans for unification of dental and medical activities in the Armed Forces. Results of the discussions will remain confidential pending further study, according to Dr. Friedrich.

LEGISLATION

A.D.A. BACKED APPROPRIATION FOR DENTAL RESEARCH INSTITUTE ADVANCES IN CONGRESS

The A.D.A. sponsored $2,000,000 appropriation for construction of a building to house the National Institute of Dental Research was approved by the Senate budget committee in mid-April and was sent to the floor where it was expected to pass the full Senate.

An authorization for the funds, which are included in the Federal Security Agency appropriation bill for the coming fiscal year, was included in the Dental Research Act, passed by the 80th Congress, last year. However, President Truman failed to include the item in his budget message to the new 81st Congress.

Efforts to have the appropriation inserted in the Security Agency's budget measure were undertaken by the A.D.A. Council on Legislation. Early last month the Council's chairman, Carl O. Flagstad, was joined by five senators—Chapman of Kentucky, Hunt of Wyoming, Murray of Montana and Pepper of Florida, all Democrats, and Taft of Ohio, Republican—in urging approval of the funds.

Present plans call for the building to be constructed on the grounds of the National Institutes of Health, at Bethesda, Md., and, following favorable Senate action on the appropriation, the

entire Security Agency finances bill will be sent back to the House of Representatives for consideration.

In testimony before the Senate committee on appropriations, Dr. Flagstad pointed out that the A.D.A. has been campaigning for a dental research act for ten years and that the proposal always has had "strong bi-partisan support."

Quoting from previous testimony before the Senate labor and public welfare committee, he said: "Dental diseases are among the most prevalent of human ailments. Almost everyone is afflicted with them. Dental caries or decay begins almost as soon as the child's first teeth erupt. At the age of six, more than nine out of ten children have one or more decayed teeth. At this age caries usually begins in the permanent teeth, and by the time a boy or girl is 18, nine teeth, on the average, have become decayed, and several teeth of necessity have been extracted." He cited these problems as underlying the basic need for a Dental Research Institute with its own facilities."

Answering his own question as to why the Association stresses the need for a separate building for the Dental Research Institute, Dr. Flagstad said that in addition to providing facilities "it will give assurance to those who may be attracted into dental research as a life's work that there will be continuity to their efforts." Under the proposed plan, the $2,000,000 appropriation will be broken down so that about $100,000 may be spent for plans and specifications, and $1,900,000 for actual construction. It is not believed that more than $500,000 would be expended in 1950.

Prospects for several other A.D.A. backed legislative measures also were brightened recently. They include the companion bills introduced in Congress by Senator Lester C. Hunt (D., Wyo.) and Representative L. Mendel Rivers (D., S.C.) which would create administrative parity for the Army Dental Corps with the Medical Corps. It is understood that both the Dental Corps and the Medical Corps have given clearance to measures with suggestions for only a few minor changes in the original bills' wording. The bills are now in the hands of high staff officials preparatory to being sent on to the Secretary of Defense for a final decision on what the Military Establishment's stand will be when the legislation is brought up for Congressional committee hearings.

Two other bills have been given tentative approval by the Veterans Administration. One, introduced by John E. Rankin (D., Tenn.), in the House of Representatives calls for inclusion of dentists in the specialist pay scale which ranges up to about $11,000 a year. The other, also introduced by Mr. Rankin, creates a "chief" grade for dentists which allows them to draw salaries equal to their top-most medical counterparts.

In connection with a bill to increase postal rates for THE JOURNAL and other publications presently using second class mail, Francis J. Garvey, secretary of the Council on Legislation, submitted an Association statement opposing passage of the bill in its present form to the Senate and House committees on the post office and civil service.

He pointed out that the existing postal law was designed to aid scientific, religious and educational publications through a subsidy in the form of a deferential rate. Under the proposed measure the rate for THE JOURNAL would be increased 452 per cent the first year the law was in effect and would rise to 578 per cent in subsequent years.

The statement urged amendment of the new legislation by continuing the present rate of one and a half cents a pound for "newspapers or periodicals maintained by and in the interest of religious, educational, scientific, philanthropic, agricultural, labor or fraternal organizations or associations, not organized for profit . . ."

A. D. A. AFFAIRS

SPECIAL INFORMATION PACKET FOR DENTAL SOCIETIES READY

A special packet of material, which includes suggestions for state and local dental society programs related to compulsory health insurance, is being distributed to society secretaries by the A.D.A. Bureau of Public Information.

Containing background information for speeches, radio scripts, news releases and similar projects, the packet is designed to aid in the current campaign to inform the profession and the public of the facts concerning compulsory health insurance and the A.D.A. program for improving the nation's dental health. In addition, the packet contains suggested resolutions and other material for use by speakers' bureaus, dental society press committees and other society agencies.

All packets will be distributed by state and local society secretaries or other designated officials, the Bureau states, adding that only a limited number of the packets are available.

A.D.A. CONVENTION HOUSING BUREAU OPENS THIS MONTH

The housing bureau which has been set up in San Francisco to handle reservations for those planning to attend the 90th annual session of the A.D.A., Oct. 17-20, goes into operation this month and official reservation blanks are printed on advertising pages 24-25 in this issue of THE JOURNAL. Extra copies of the blank are available on request to the Central Office.

While pointing out that San Francisco is a city of "many small but excellent hotels," John J. Hollister, business manager of the Association, said that only requests made on the official reservation blank to be found in THE JOURNAL will be honored by the housing bureau. The blank will appear in every issue of the magazine until the meeting. He added that almost 100 San Francisco hotels are cooperating but that because of space limitations only a few could be listed on the reservation blanks.

Central Office officials recently completed arrangements for joint headquarters hotels, the Mark Hopkins and the Fairmont, across the street from each other while arrangements for handling public relations activities were begun last month by the local affairs committee and H. B. Bain, director of the Association's bureau of public information.

Meanwhile two state dental societies, Ohio and New Jersey, have announced that special trains are being made available for the trip to San Francisco. Both parties will tour points of scenic interest enroute.

Adequate hotel accommodations will be available for all attending the session, the business manager said, adding that reservations should be made at the earliest date possible.

Other developments related to the annual session include the appointment of Donald A. Wallace, secretary of the A.D.A. Council on Dental Therapeutics, as director of scientific exhibits and motion pictures, and the announcement that forms are now available for nomination of clinicians for the table clinic program.

In announcing Dr. Wallace's appointment, H. B. G. Robinson, chairman of the A.D.A. Section on Scientific Exhibits, stated that all exhibits this year must be sponsored by individuals. Previously organizations were allowed to sponsor exhibits. This change in the rules, however, does not mean that some credit may not be given to a dental society or other group participating in preparation of an exhibit.

The Section also is planning a motion

picture program which is scheduled to run from 10 a.m. to 5 p.m. each day of the meeting.

Exhibitors may receive applications from Dr. Wallace at the A.D.A. Central Office, 222 E. Superior St., Chicago 11.

Willard H. Hurley, of Portland, Ore., chairman of the Section on Clinics, states that table clinics will be limited to 200 clinicians. Any A.D.A. member may secure an application and nominate a clinician.

Table clinics will be presented on Tuesday morning, Oct. 18 and Thursday afternoon, Oct. 20. Applications may be secured by writing L. M. Cruttenden, assistant secretary, at the Central Office, or from Dr. Hurley, the Selling Building, Portland.

LIBRARIAN AND STATISTICIAN JOIN CENTRAL OFFICE STAFF

D. A. Washburn

Two appointments to the A.D.A. Central Office staff, those of Donald A. Washburn as librarian and director of the Bureau of Library and Indexing Service, and Basil D. Moen as assistant director of the Bureau of Economic Research and Statistics, were announced recently.

The appointment of Dr. Washburn, of New Lennox, Ill., to the library post followed the resignation of Murrell W. Wellman, of Joliet, Ill., who left to take a position with the Louisiana state library extension service.

Dr. Washburn is a graduate of Northwestern University school of dentistry in addition to being the holder of a Bachelor of Arts degree from Albion College and a Bachelor of Library Science degree from the University of Chicago. He recently was employed as research consultant and assistant research librarian at John Crerar Library, Chicago. He is a member of the Special Libraries Association.

B. D. Moen

Mr. Moen's appointment, on May 1, as assistant director of the Bureau of Economic Research and Statistics is the first step in the Association's program to provide the dental profession with its own research and statistics agency.

Studies of a number of problems in the fields of economics and statistics will be undertaken immediately by Mr. Moen, formerly a research and teaching assistant at the University of Minnesota. Mr. Moen holds a Bachelor of Science degree from State Teachers College, Moorhead, Minn., and a Master of Arts degree from Minnesota. He is a veteran of World War II, and is presently studying for his Ph.D. at the University of Minnesota.

A.D.A. MEMBERSHIP RISING; STUDENT SECTION IS DOUBLED

Membership in the A.D.A. shows an increase in 21 states as of March 31, this year, in comparison to the same date in 1948, a recent report on membership discloses. Student memberships are more than double those of last year on the comparative March dates.

The Association reported a total membership of 65,116 on March 31, 1949 as compared with 62,246 on the same date in 1948, but total active members this year had reached only 55,865 whereas

last year there were 56,981 on the rolls.

Student memberships, dues for which are only a fourth of those for active members, and new life memberships, for which no dues are paid, accounted for most of the increase in total membership.

On March 31, student memberships were 6,947, more than double those of the same date last year. Life memberships had increased from 1,794, on March 31, 1948 to 2,131 on that date this year. Three of the four federal government dental corps also registered increases this year. A complete breakdown of A.D.A. membership is to be included in the June issue of THE JOURNAL.

A.D.A. TO CONDUCT DENTAL LIBRARY CONFERENCE IN JUNE

A conference on dental school library problems covering library procedures, nomenclature and indexing will be held at the A.D.A. Central Office, Chicago, June 27, John E. Gurley, of San Francisco, chairman of the Advisory Committee to the Bureau of Library and Indexing Service, announces.

Among those to be invited are librarians from all approved dental schools and representatives of a number of other dental specialty library groups.

NON-THERAPEUTIC, CLEANSING MOUTHWASHES MAY BE ADVERTISED

Official publications of the A.D.A. may now take certain types of mouthwash advertising under a recent change made in advertising rules and regulations.

The new rule, substituted for one prohibiting the acceptance of any mouthwash advertising, allows non-therapeutic, cleansing mouthwashes to be advertised. In defining such products, the rule states: "A non-therapeutic and cleansing mouthwash is . . . one which aids in cleansing the mouth and for which no therapeutic claims are made." General rules and regulations which apply to all advertising in A.D.A. publications will remain in effect.

NEW MOTION PICTURE ON DENTAL HEALTH AVAILABLE

A motion picture entitled "Getting Ready for the Dentist" is available from the A.D.A. on a rental basis, according to Allen O. Gruebbel, secretary of the Council on Dental Health.

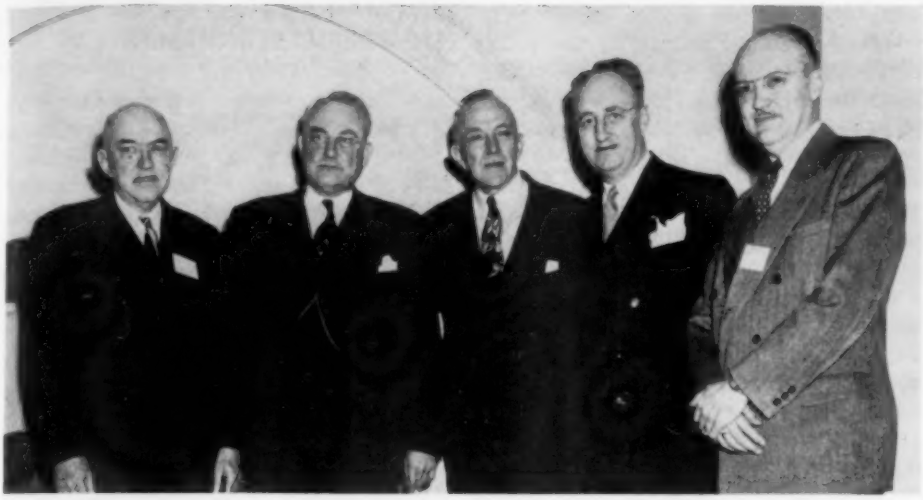
The film demonstrates how parents can aid young children in developing the proper attitude for their first visit to the dentist. Rental charges, including shipping costs, are $2.50 for each showing or $4.50 per week.

DENTAL SOCIETIES

DENTAL HEALTH WORKSHOP TO BE HELD IN TENNESSEE

A dental health workshop will be held May 13-15 by the Tennessee State Dental Association, in Knoxville with five official delegates from each component dental society and 15 consultants selected by a steering committee participating.

Lectures will be given by Kenneth A. Easlick, of the University of Michigan, on preventive procedures, John W. Knutson, of the U. S. Public Health Service, on the present status of fluoride therapy and by Philip E. Blackerby, of the Kellogg Foundation, Battle Creek, Mich., on methods for improving the dental health of children.



Among those taking a prominent part in the 89th annual meeting of the Kentucky State Dental Association, held at Louisville, April 3-6, were (L. to R.) Robert P. Thomas, Sixth District A.D.A. trustee; Clyde E. Minges, A.D.A. president and 1919 graduate of the Louisville dental school; Julian Dismukes, immediate past-president of the Kentucky Association; Daniel F. Lynch, Fourth District A.D.A. trustee, and J. L. Walker, new president of the Kentucky Association. The meeting honored W. M. Randall, long a prominent figure in State Association and dental education activities.

EXECUTIVE SECRETARY NAMED BY D. C. DENTAL SOCIETY

The District of Columbia Dental Society recently appointed Walter Holland as executive secretary and administrative assistant. The elected secretary-treasurer, Carl Hayden Wood, will continue in that position.

STATE DENTAL SOCIETIES SCHEDULE TWENTY MEETINGS

State dental society activity will reach its peak this month. A total of 20 annual meetings are scheduled to be held in that many cities across the nation.

South Carolina leads off with its meeting May 1-3 at Myrtle Beach. Other state societies scheduled to meet are: Alabama, May 2-4, Biloxi, Miss.; Iowa, May 2-4, Des Moines; Maryland, May 2-4, Baltimore; Massachusetts, May 2-5, Boston; Texas, May 2-5, Houston; Montana, May 5-7, Bozeman; North Dakota, May 8-11, Bismarck; Nebraska, May 9-11, Lincoln; Illinois, May 9-12, Peoria; New York, May 10-13, Buffalo; South Dakota, May 15-17, Aberdeen; Indiana, May 16-18, Indianapolis; Tennessee, May 16-19, Knoxville; North Carolina, May 19-21, Pinehurst; West Virginia, May 19-21, Wheeling; Vermont, May 22-24, Woodstock; Kansas, May 22-25, Topeka; New Mexico, May 23-25, Albuquerque and Colorado, May 25-27, Colorado Springs.

Other May dental meetings reported to THE JOURNAL are: Akron Dental Society, 24th annual clinic meeting, May 11; Alpha Omega Fraternity, national council, New York, May 15; Ontario Dental Association, 82nd annual meeting, Toronto, May 16-18; and the Mid-Atlantic States Seminar in Oral Medi-

cine, Poccono Mountains, May 22-27.

The New York Section of the International Association for Dental Research will hold a meeting on May 5, at the New York University college of dentistry.

OFFICERS CHANGE AT 89th MEETING OF KENTUCKY SOCIETY

J. L. Walker, of Louisville, Ky., recently succeeded Julian Dismukes, of Paducah, Ky., as president of the Kentuck State Dental Association following election of officers at the organization's 89th annual meeting, in Louisville, April 3-6.

Other officers elected at the meeting dedicated to W. M. Randall, long active in State Association and dental education activities, included: M. T. Buch, Newport, Ky., president-elect; Arthur Welsh, Louisville, first vice-president; O. M. Lyon, Morehead, second vice-president and R. J. Redman, Henderson, third vice-president. A. B. Coxwell, of Louisville, was re-elected secretary-treasurer.

PERCY PHILLIPS, A.D.A. SPEAKER, TO BE HONORED

P. J. Phillips

Percy T. Phillips, of New York, will be honored with a testimonial dinner to celebrate his election as first speaker of the A.D.A. House of Delegates, May 7, at the Statler Hotel, New York. The dinner is being sponsored by the First District Dental Society of the Dental Society of the State of New York and reservations are available at $10 per person.

Dr. Phillips, long active in A.D.A. affairs, was named to the new post unanimously by the delegates to the 1948 annual meeting of the House, in Chicago last September. The position was created when the Association's new Constitution and Bylaws were adopted earlier in the same meeting.

ARMY AND NAVY

ARMY SURGEON GENERAL PROMISES PERSONAL SUPPORT FOR A.D.A. ARMY BILL

Following receipt from Army Surgeon General Raymond W. Bliss that he has no personal objections to the A.D.A.'s efforts to achieve administrative parity for the Army Dental Corps with the Medical Corps through legislation, the Association has offered to cooperate in the current voluntary recruitment campaign being conducted by the Armed Forces. An A.D.A. sponsored bill to create "parity" already has been introduced in Congress.

Authorization for the Association's participation in the campaign which is aimed particularly at providing health personnel for the Army where the shortage has been termed "critical" came following a meeting of a special committee of the Board of Trustees, in Washington, D. C., March 13.

In a letter to Charles P. Cooper, chairman of the Medical Advisory Committee to the Department of Defense, Harold Hillenbrand, secretary of the A.D.A.,

outlined methods by which the Association would assist the recruitment drive but added that: "It should not be assumed . . . that this tender of cooperation in the voluntary recruitment campaign alters the Association's original view that no campaign for the recruitment of a substantial number of dental officers will be productive until the inequalities under which dental officers served in the Army are removed by corrective legislation." The current Armed Forces drive to enlist former A.S.T.P.'s and V-12's to alleviate the shortage of physicians and dentists had netted only about 200 volunteers, at last report.

Dr. Hillenbrand's letter also pointed out that this offer of cooperation is not connected in any way with "automatic support of future legislation for the recruitment of health personnel for the Armed Forces."

Latest reports from Washington indicate that even the apparent reluctance of civilian dentists and physicians to volunteer for active duty has brought no new developments along the line of a special draft of professional personnel. The only positive disclosure so far has been in the form of a statement that such action "may be necessary."

Meanwhile, new Secretary of Defense Louis A. Johnson announced that he is "pleased" with the initial response to his predecessor's "urgent appeal to young physicians and dentists to volunteer for the Armed Forces." He said some 1,600 physicians and dentists had sent telegrams in reply to Mr. Forrestal's "personal" letter to some 8,000 former A.S.T.P.'s and V-12's who had received their education in part or in full from the government but had seen no active duty. About 7,000 other physicians and dentists who were deferred from the wartime draft to complete their education also received the appeal.

Mr. Johnson, however, re-emphasized the critical situation which faces the Armed Forces, pointing out that by the end of July the services would have a deficit of 1,600 physicians and 1,160 dentists. These figures, he said, would increase to 2,200 physicians and 1,400 dentists by December.

Referring to those who still have not signed up for active duty, the Defense Secretary said: "This group of men who saw no service overseas and took no direct or active part in the war should recognize that they owe their country and profession a debt which should be repaid with a two-year tour of duty with one of the Armed Forces, now when their training and experience is so vitally needed."

To expedite action on the program, Secretary Johnson is sending each county dental and medical society a complete list of the names of dentists and physicians who did not reply to Mr. Forrestal's letter or who answered negatively. He asks county chairmen personally to contact these men "to determine if and when they will be available for duty with one of the Armed Forces" in addition to requesting that each chairman send him a written report on the status of each dentist and physician concerned. Hospital administrators throughout the country also are being asked to "review their staffs of physicians."

Meantime, the Defense Department's Medical Advisory Committee is undertaking a study of the military establishment's workload to determine the actual need for health personnel.

Second Army Headquarters, Ft. George G. Meade, Md., additionally pointed up the need for volunteers recently when it disclosed that in its area alone more than 50 vacancies exist for dentists. The extravagant use of dental personnel in the last war probably will be the subject of inquiry and comment by the Medical Advisory Committee.

In releasing results of a dental survey of the Second Army's 7,200 enlisted men, Col. William E. Sankey, Second Army dental surgeon, stated that the need for

5,940 extractions, 27,577 fillings, 1,501 full or partial dentures and 245 anterior bridges was established. He estimates that the services of 20 dentists for a one year period would be required to overcome the need. The release made by the Second Army did not attempt to reconcile the discrepancy in the number of dentists needed.

Another announcement, this one from Army headquarters in Washington, D. C., states that dentists applying for commissions in the Army and desiring service particularly in the Air Force will be permitted to serve there. This ruling abollishes the arbitrary assignment of health personnel to the Army in spite of the wishes of the individual dentist or physician. It is also thought that the previous ruling was one of the major blocks to voluntary recruitment.

VETERANS

DENTAL ADVISORY COUNCIL TO V.A. WILL MEET MAY 2

The Dental Advisory Council to the Veterans Administration will meet May 2, in Washington, D.C., to discuss the V.A.'s new organizational pattern and its effects on dental service, according to Bion East, V.A. dental director.

Elimination of 13 branch offices by the Administration and the appointment of six area medical directors will be among the problems taken up in an effort to devise a streamlined system of administration for dental activities. At present headquarters for all V.A. dental activities are located in the Central Office in Washington.

Dr. East also disclosed that Paul H. Jeserich, director of the W. K. Kellogg Foundation Institute and professor of operative dentistry, and director of operative clinics, University of Michigan dental school, has been named chairman.

DENTAL EDUCATION

SOUTHERN CALIFORNIA NAMES J. C. BRAUER NEW DENTAL DEAN

J. C. Brauer

John C. Brauer, director of postgraduate dental education at the University of Washington college of dentistry, Seattle, has been appointed dean of the school of dentistry, University of Southern California.

Announcement of the appointment was made early last month by Fred D. Fagg, Jr., president of the University, who also stated that the 52-year old dental school is "planning an extensive dental devolopment program that will include new building facilities."

Dr. Brauer, president of the American Academy of Pedodontics and chairman of the American Board of Pedodontics, fills a position left open by the death last November of Dean Julio Endelman, a veteran of 34 years on the dental school staff.

Before joining the faculty of Washington University two years ago, Dr. Brauer practiced children's dentistry in Los Angeles and during the war was chief of the dental standards branch of the Army surgeon general's office in Washington, D. C. He was in charge of professional services and policies for the Army Dental Corps.

Dr. Brauer's teaching experience began in his home state of Nebraska and he later taught in Iowa and at Emory University dental school. He received his degree in dentistry from the University of Nebraska college of dentistry at Lincoln, Nebraska in 1928.

ST. LOUIS UNIVERSITY OFFERS POSTGRADUATE DENTAL COURSES

Postgraduate courses in crown and bridge prosthesis, complete denture prosthesis and roentgenology will be offered by the St. Louis University school of dentistry during June and July, according to L. R. Main, dean.

Courses in orthodontics, oral surgery and complete denture prosthesis leading toward a Master of Science degree are being offered in the graduate division, he said, For additional information write John Victor Olson, St. Louis University school of dentistry, 3556 Caroline St., St. Louis 4.

ORAL CANCER IS SUBJECT OF COURSE AT NORTHWESTERN

Oral cancer will be the subject of a two-day program of study to be offered by the Northwestern University dental school on June 7-8. Illustrated lectures and clinical demonstrations will be featured in the course.

Instruction will be given by John A. Rogers, executive director, Illinois division, American Cancer Society and James Barrett Brown, professor of surgery, Washington University medical school. Medical and dental school faculty members from Northwestern who will appear on the program are: Edward Wheelock, associate professor of pathology and pathologist at Passavant Hospital, and Frederick W. Merrifield, professor of oral surgery.

Both dentists and physicians may attend the course for which reservations must be made in advance. Further information may be secured from Dean Charles W. Freeman, Northwestern University dental school, 311 E. Chicago Ave., Chicago 11.

TEMPLE JUNIOR A.D.A. TO HOLD FIRST ANNUAL "DAY"

In an effort to impress upon undergraduate dental students the importance of dental meetings, the students at Temple University school of dentistry will hold their first annual Junior A.D.A. Day, May 9.

The program, which will be held at the dental school, will include both scientific essays and table clinics. Harold Hillenbrand, secretary of the A.D.A., will speak at the evening banquet.

Stressing the educational advantages of such programs, M. Robert Bonda, publicity chairman, states that the Temple student body hopes to make Junior A.D.A. Day an annual event.

RESEARCH

AERO-MEDICAL LABORATORY IS SITE OF DENTAL STUDIES

The school of dentistry among other interested departments of the University of Illinois is undertaking special research in the field of physical environment in health and disease at the University's new $400,000 aero medical and physical environment laboratory.

A. C. Ivy, vice-president of the University's professional colleges, has been appointed director of the laboratory which was completed last month. Research studies to be conducted are expected to aid in the improvement of therapeutic procedures in certain types of disease. These studies also will supplement existing knowledge in the field of aviation medicine.

RESEARCH ASSISTANTSHIP OPEN AT UNIVERSITY OF CALIFORNIA

A research assistantship, largely in the field of dental medicine, is open to young dental graduates at the University of California college of dentistry. The position carries a salary of $2,400.

In announcing the opening, Willard C. Fleming, dental school dean, emphasized that candidates should be interested in preparing for a career in dental teaching and research and that the research assistant is permited to take up to four units of graduate work leading toward a Master's Degree. The assistant will work under Hermann Becks.

SPECIAL RESEARCH LABORATORY INSTALLED AT N. Y. UNIVERSITY

Research in periodontia was advanced recently by the addition of a special research laboratory at New York University college of dentistry. The laboratory and its equipment were furnished through a research fund established by former postgraduate students in periodontia headed by Sam Robbins, of Cleveland.

Many projects already have been started by two research fellows, Alexander Soberman and S. Sigmund Stahl, college officials say. Undergraduate and postgraduate students with special aptitude for research are being permitted to perform projects under supervision.

H. TRENDLEY DEAN TO ADVISE ON FLUORINATION OF WATER

H. Trendley Dean, director of the National Institute of Dental Research, has been named an advisor of a Special Committee on American Waterworks Association Policy on the Fluorination of Water Supplies.

Among the cities in the United States and Canada conducting fluorination experiments are Evanston, Ill.; Grand Rapids, Mich.; Midland, Mich.; Sheboygan, Wis.; Ottawa, Kans.; Marshall, Texas; Newburg, N. Y.; Southberg, Conn., and Brant Ford, Ont. A similar program recently was undertaken in Charlotte, N. C.

DENTAL RESEARCH RESIDENCY OPEN AT NEW YORK HOSPITAL

A residency in dental research will be available in September at New York's Jewish Sanitarium and Hospital for Chronic Diseases, a non-sectarian institution, according to Leonard Kohn, director of the dental department.

Qualifications and a "protocol for a problem to be investigated" are required of applicants for the position which pays $1,800 a year and includes full maintenance.

INTERNATIONAL

BRITISH MEDICAL ASSOCIATION ORGANIZES PROTECTIVE GUILD

The British Medical Association, which once recommended that its members join in England's compulsory National Health Service, recently organized a $4,000,000 program to protect its members now serving in the government medical scheme.

Called the British Medical Guild, the new organization to operate the Association's program was created at a conference attended by some 400 delegates, in London. Thomas J. Horder, one of King George's physicians, opposed the scheme.

Emphasizing that it would not be the Guild's policy to organize a strike or try to establish a "closed shop," H. Guy Dain, chairman of the conference, stated that the program's purpose is to "protect

all doctors engaged in the service whether they are members of any political body or not, in order that we may organize concerted action."

One of the Guild's first projects, it is reported, will be to request a wage increase of $63.50 a week for some 20,000 family physicians enrolled in the health service.

PERIODONTAL RESEARCH TO BE DISCUSSED IN EUROPE

The eleventh Congress of the Association Pour Les Recherches Sur Les Paradentopathies (Association for Periodontal Research) will be held at Groningen, Netherlands, June 28 through July 2. Subjects to be discussed include nomenclature and classification, functional treatment, and orthodontics and periodontal disease. Further information may be secured from a Dr. Michaelis, Wilhelminapark, 5-Oegsteest, Netherlands.

DENTAL EDUCATION TO BE TOPIC OF OVERSEAS MEETING

An effort will be made to trace the tendencies and the evolution of dental education when the Federation Dentaire Internationale meets in Milan, Italy, May 30 through June 4.

A preliminary program for the Federation's 37th annual session lists three other subjects for discussion during the scientific portion of the meeting. Dental responsibilities in national health will be a major item on the agenda and will be followed by discussions of prevention of dental disease and the "precise significance of the relationship established between the W.H.O. (World Health Organization) and the F.D.I."

Excursions to scenic and historical sites in and around Milan have been arranged, in addition to formal and informal receptions and banquets. The Federation also will conduct its annual business session during the meeting.

GENERAL NEWS

NATIONAL PHYSICIANS COMMITTEE GOES OUT OF BUSINESS APRIL 1

The National Physicians Committee for the Extension of Medical Service, started as a lobbying and publicity agency ten years ago to wage a fight against compulsory health insurance, ceased operation on April 1. This announcement was made on April 14 to all members and contributors by Edward H. Cary, chairman of the Board of Trustees of the Committee.

Dr. Cary stated that the "National Physicians Committee met in Chicago April 10, 1949 and voted (1) to approve the action of its Management Committee in authorizing cessation of all activities as of April 1, 1949 and (2) to liquidate the affairs of the National Physicians Committee in an orderly manner." The meeting to consider "further action looking toward dissolution of the organization will be held in Atlantic City in June, 1949."

The announced reason for dissolution of N.P.C. was that the House of Delegates of the American Medical Association announced two years ago that "the American Medical Association should and must do its own public relations work." Dr. Cary urged the personnel of the state committees which had been created by N.P.C. "to offer their services to the new American Medical Association Agency," which will carry out an

expanded public relations program at a cost of about $3,250,000.

While Dr. Cary's statement did not refer specifically to the National Committee of Dentists, which was created by N.P.C., it was indicated that 46 state committees of dentists had been established by the National Committee of Dentists. In the absence of a statement to the contrary, it is assumed that the N.C.D. will follow its parent organization into inactivity.

D.C. DENTAL EXAMINERS TO HOLD LICENSURE EXAMINATIONS

The District of Columbia Board of Dental Examiners will hold an examination for the licensure of dentists and dental hygienists during the week beginning June 6, at Georgetown University dental school, according to Doran S. Thorn, secretary-treasurer of the Board. Further information may be secured by writing the Board, 1835 Eye St., N.W., Washington 6, D. C.

HOMER C. BROWN CHOSEN TO RECEIVE FIRST BURKHART AWARD

Homer C. Brown, of Columbus, Ohio, and president of the A.D.A. in 1913-14, has been selected to receive the first Harvey J. Burkhart Memorial Award by the Dental Society of the State of New York. The award is to be made in recognition of Dr. Brown's contributions to dental progress over many years

Dr. Burkhart, in whose honor the award is made, was himself a past-president of the A.D.A. having served in 1898-99, and was a member of the Board of Trustees until his death in 1946. He was known internationally for his work as director of the Eastman Dental Dispensary, Rochester, N. Y., and for his work in establishing similar Eastman clinics in a number of foreign countries.

DENTISTS URGED TO COOPERATE IN FEDERAL ECONOMICS SURVEY

A questionnaire designed to provide information on the economic status of dentists throughout the nation has been sent to some 25,000 members and nonmembers of the A.D.A. by the Department of Commerce. The survey has the approval of the Association.

In a letter accompanying the questionnaire, it is pointed out that all information obtained in the survey from individuals will be held in strict confidence and that no comparison with federal income tax returns can be made since those documents are not available to the Department.

The letter states that since the last survey conducted in 1942, striking changes have occurred both in the national economy as a whole and in the status of the dental profession.

In cooperation with the Department, the A.D.A. has issued the following statement: "We urge all dentists who receive the accompanying questionnaire to answer it to the best of their ability. Your cooperation will go far towards filling the gaps in our current knowledge, and will represent a genuine contribution on your part to the welfare of your profession. In order to get a true picture of the dental situation since 1943, it is highly important that all types of dentists cooperate."

ORAL PATHOLOGISTS TO HOLD MID-YEAR SYMPOSIUM IN JUNE

The second annual Mid-Year Symposium of the American Academy of Oral Pathology will be held June 18, at the Army Institute of Pathology, Washington, D.C., and will be devoted to study of diseases and tumors of the reticuloendothelial system.

In announcing the meeting, Joseph L. Bernier, secretary-treasurer of the Academy, stated that R. Philip Custer, of

Philadelphia's Presbyterian Hospital, will act as moderator. William Ehric, of the University of Pennsylvania graduate school of medicine, will present a paper on the role of various leukocytes in inflammation.

Attendance at the meeting will be restricted to 60 in an effort to stimulate individual comment, Dr. Bernier said, adding that a $5 registration fee is being asked. Applications will be accepted in order of receipt he said.

DENTAL MEDICINE ACADEMY TO DISCUSS PSYCHOSOMATICS

The third annual meeting of the American Academy of Dental Medicine will open June 4-5, in New York, with a symposium on psychosomatics. The remainder of the program will cover a wide range of dento-medical problems.

In making the program announcement, J. Lewis Blass, Academy president, said that non-members are invited to attend.

The symposium will feature three speakers whose discussions will cover psychosomatics in children's dentistry, in general dentistry and in oral medicine.

Organized in 1945, the Academy has an international membership of more than 300. Further information may be secured from William M. Greenhut, 124 E. 84th St., New York 28.

TEMPLE DENTAL ALUMNI TO HONOR DEAN G. D. TIMMONS

Gerald D. Timmons, dean of Temple University school of dentistry and former executive secretary of the A.D.A., will be honored at a testimonial dinner May 26 by the dental school Alumni Association.

A full day of scientific discussion is planned to precede the dinner. Participants in the program include Ernest D. Nuttall, of the University of Maryland dental school, who will speak on crown and bridge; H. Trendley Dean, director of the National Institute of Dental Research, who will speak on dental caries and S. Gordon Castigliano, a physician from Temple, who will discuss cancer.

J. Ben Robinson, dean of the University of Maryland dental school, will be the main speaker at the dinner for which reservations may be secured from Raymond C. Walter, 3223 N. Brood St., Philadelphia. The dinner will cost $6. All members of the dental profession are invited to attend both the scientific session and the dinner.

FUTURE IN DENTISTRY IS BRIGHT, FORECASTERS STATE

Opportunities for future dentists will be excellent, according to a recent survey by a leading national business publication and the recently published Veterans Administration "Occupational Outlook Handbook."

The business publication, U.S. News & World Report, states that about 1,700 to 1,900 new dentists are needed each year to replace those who die or retire and that the nation's dental schools graduate only "a few hundred more than that each year—not even enough to keep up with population growth."

The V.A.'s handbook states that "the shortage of dentists is likely to continue and may become even more acute." The accumulation of dental defects resulting from the acute shortage of dentists during the war has been a major factor in creating the demand for treatment, it says. Copies of the handbook are available for $1.75 from the Government Printing Office, Washington 25, D.C.

BOOK REVIEWS

Oral Surgery. By Kurt H. Thoma, D.M.D. Two volumes, 1,521 pages with 1,631 illustrations, 121 in color. Cloth. Price $30. St. Louis: C. V. Mosby Company, 1948.

This timely and complete text was written to give specific descriptions of the various operative technics for the correction and elimination of oral surgical abnormalities and diseases, as well as to describe general supportive treatment, which should be considered inseparable from the treatment of the regional disease.

As is pointed out in the preface, the oral surgeon should have adequate training beyond that of the undergraduate dental curriculum, whether he plans to practice general dentistry including oral surgery or to limit his practice to the latter field. For the practitioner primarily interested in either oral surgery or general dentistry, or for the student of either, this text will be an invaluable addition to the library on oral surgical anomalies and diseases.

Chapter 1 deals with surgical principles, including those of bacteriology, pathology, anesthesia, asepsis, antisepsis and general surgical technics as they relate to oral surgery. Chapter 2 discusses the general care of the patient, chemotherapy, the use of antibiotics, vitamin deficiencies, shock and care of the patient with some of the more common generalized diseases.

Chapter 3 describes the technics of dentoalveolar surgery. Included are the removal of teeth, preparation of the osseous and soft tissues, the sectioning and removal of all types of unerupted teeth, the treatment of dentoalveolar abscesses, apicoectomy and periodontal surgery. This chapter is excellent for the dental student and for the general dentist who includes dentoalveolar surgery in his practice.

Chapter 4 deals with the treatment of traumatic diseases of the jaws. All types of fractures and facial injuries are discussed, and various methods of treatment are given. Treatment planning and the general care of the patient are stressed, and good illustrations and case histories amplify the discussion.

Chapters 5 and 6 describe the treatment of odontogenic diseases of the maxillary sinus, a region frequently involved secondarily by dental disease, and the treatment of osteomyelitis and necrosis of the jaws respectively. The indications for surgical intervention and general supportive measures are stressed, as well as the treatment of uncommon conditions, such as actinomycosis, syphilis and necrosis due to irradiation and application of chemical agents.

Chapter 7 is given to the treatment of diseases of the temporomandibular joint, including fracture, dislocation, arthritis, ankylosis and tumors. Especially important is chapter 8, describing the various types of infections involving the fascial planes of the head and neck and how they should be treated. Good illustrations show why these infections arise and spread along these planes and where drainage should be instituted.

Chapters 9 and 10 cover diseases of the salivary and mucous glands, dermoid cysts and their surgical treatment and disturbances of the fifth and seventh cranial nerves. The treatment of all types of cysts arising in the jaws is well discussed and illustrated in chapter 11. The various methods for their eradication are given.

Chapters 12 and 13 describe the elimination of benign and malignant tumors in and about the oral cavity. Discussion is given to the treatment of metastatic lesions as well as to prosthetic and plastic restoration and repair of operative defects. Illustrations of the various tumors, as well as photomicrographs, are excellent.

Chapter 14 describes the surgical treatment of congenital and acquired deformities of the jaws.

The general practitioner of dentistry and of medicine as well as the student will find much of interest in the two volumes. The dentist is often consulted regarding oral surgical diseases, and even though he does not attempt major surgical procedures, he should be interested from a diagnostic standpoint and be well versed in modern methods of treatment.

Some of the surgical technics presented are those of the author, which he has found most effective in his hands. Other clinicians

use many variations of these, with equally successful results.

Oral Surgery is a clinical book, and does not delve in detail into pathology, anatomy and physiology of the regions under discussion, but it does cover completely the surgical conditions in and about the oral cavity and associated structures.—*Howard C. Miller.*

Introduction to Human Physiology. By William D. Zoethout, Ph.D. Cloth. 426 pages with 138 illustrations and 4 color plates. Index. Price $4. St. Louis: C. V. Mosby Co., 1948.

Since much of the actual practice of disease prevention is based on physiologic principles, dentists interested in preventive dentistry can profit materially by studying this book.

Recently, considerable attention has been given to what is called psychosomatic dentistry. To understand clearly what is involved in this phase of dental practice, a brief survey of the physiology of the nervous system is most helpful, and here it is in relatively simple language.

Dentists generally take marked interest in diet and nutrition but do not always have a clear and complete picture of the basic processes and a solid foundation of fact for their opinions. This text supplies adequate information and some sound advice.

Oversimplification in places has led, however, to misleading statements as on page 19 where it is stated that: "Compounds containing carbon are known as organic compounds, in distinction of the inorganic which do not contain carbon." Certainly the mineral carbonates in numerous instances are not organic compounds, although they contain considerable amounts of carbon.

Information about the ultimate division of matter not only into such small particles as molecules and atoms, but also into still smaller units, such as electrons, is now so general that to omit discussion of it even from a simple text on physiology is probably not justified. It also must be pointed out that not all infectious diseases cause an increase in leukocytes (p. 105). Typhoid fever, for example, actually produces a decrease in the number of leukocytes. Osmosis (p. 101) may occur between solutions other than solutions of proteins. Other factors than the size of the vessel lumen bear a relation to blood pressure, such as the viscosity and density of the blood on one hand and the smoothness or stickiness of the vessel walls on the other (p. 186).

A list of pertinent, helpful questions follows each chapter. The index is generous, and the illustrations, well supplied with adequate legends, add much to the text.—*Edward H. Hatton, M.D.*

Laboratory Experiments in Physiology. By W. D. Zoethout, Ph.D. Fourth edition. 263 pages with 97 illustrations. Index. Price $3. St. Louis: C. V. Mosby Co., 1948.

The laboratory experiments offered by the author for use by students whose time allotment is limited and where equipment is at a minimum are well selected and adequate. Although planned to supplement the author's text book on physiology, any other text may be used as effectively. This fourth edition is suitably illustrated and since the author has achieved success as a teacher of this subject, the directions are clear and easy to follow. The index is excellent.

Directions for the estimation of blood cells (red and white counts, pages 94-96) can be improved by following more closely the technics in common use in hospitals and clinical laboratories and by more accurate reproductions of the slide rulings, especially those used for counts of white cells. Figure 76, page 163, does not correspond to the text description of the Schaefer method for artificial respiration. —*Edward H. Hatton, M.D.*

Technic of Medication. By Austin E. Smith, M.D., C.M., M.Sc. 255 pages. Index. Price $4. Philadelphia: J. B. Lippincott Company, 1948.

This book is intended primarily for the medical student and intern but it should be interesting and useful to many practicing physicians, dentists, nurses and pharmacists. The special technics involved in dental therapeutics are not covered.

The chapters on the prescription and oral and parenteral administration of drugs, covering 115 pages, contain much practical information in concise, easily readable form.

Technic of Medication might well be listed with other reference material for course work in dental therapeutics. Dentists who wish to refresh their knowledge of prescription writing will find the book very helpful.

A Text Book for Dental Assistants. By Irwin R. Levy, D.D.S. Second edition. 248 pages with 226 illustrations. Index. Price $4. Philadelphia: Lea and Febiger, 1948.

The author has brought this second edition more nearly up-to-date by the inclusion of illustrations on mixing silicate cement, acrylic crowns and on inlays. However, such commonly accepted equipment as automatic amalgam mixers, automatic pluggers, instrument sharpeners and electric handpiece sterilizers are not mentioned.

Procedures for various dental operations are simply and adequately explained. A chapter on sterilization is devoted to an explanation of bacteria and methods of destroying them but does not include specific information on sterilization of handpieces and burs.

The chapter on office management might have included reference to more of the specific housekeeping duties of the dental assistant. Use of the telephone as an assistant's duty also should have been given more attention.

Adequate information for patient education is given in a chapter on periodontia, but the author fails to make clear what part the assistant may play.

The book is recommended as a text for a course in dental assisting and for beginners who have not participated in a formal course. The dictionary of commonly used dental terms will be helpful.—*Anna L. Hehn.*

Rural Health and Medical Care. By Frederick D Mott, M.D., and Milton I. Roemer, M.D., M.P.H. 562 pages. Index. Price $6.50. New York: McGraw-Hill Book Co., 1948.

This probably is the first reasonably consistent study of rural health problems. The authors, Dr. Mott, presently chairman of the Saskatchewan Health Services Planning Commission, was chief medical officer of the Farm Security Administration in the U. S. Department of Agriculture. Dr. Roemer is a member of the U. S. Public Health Service, where he works primarily with problems of rural health. They are well qualified to properly separate the rural from the urban picture.

The task is large for of the total population in 1940, 43.5 per cent could be considered "rural." Migration from farm to town is so great that the benefits of scientific health care must be extended to the rural population, if the future urban citizen is to have an alert mind and a sound body.

Forty years ago, rural people were healthier than urban dwellers and had a longer life expectancy. Since then we have had what the authors term "a demonstration that health as well as life itself is purchasable." The outpouring of funds in the cities for health was not paralleled in the country and it is stated that during this period the average duration of life in urban whites increased 40 per cent but of rural whites only 19 per cent.

Public health workers look upon infant mortality as a highly sensitive measure of general welfare as well as a significant index of accomplishment. The rural picture is not bright. In 1942, nine more babies out of every 1000 died in rural communities, than in large urban cities.

To emphasize their statement that health is purchasable, the authors state "the rural infancy death rate in 1942 in New Mexico was 111.2 per thousand live births but in Connecticut, which has twice the per capita income, the rate was 26.7 per thousand."

For every physician in the rural areas there are 2.6 in the metropolitan areas, while, because of the time devoted to travel, such areas should have a supply of physicians 25 per cent in excess of urban requirements. It is pointed out that the distribution of funeral directors in rural areas is considerably more equitable than is the distribution of physicians.

Pointing up the lack of education and preventive health services, the authors state that in 1940 only 37 per cent of rural children up to eight years of age had received smallpox vaccination as compared to 89 per cent in urban areas.

But, the authors have observed that the rural population lately has become increasingly aware of the serious deficiencies in their health facilities. Recently passed legislation has provided a strong impetus to planning for hospital construction. They want health services to be accessible in terms of time and distance.

The authors feel that a public responsibility of far reaching significance is the task of unifying the administration of all types of health services in a given area. The task is large and complex, but as the health responsibilities of government expand, they are convinced that it becomes necessary to coordinate them under a single agency and that the logical nucleus

of such an agency is a department of public health.

Finally, it is the belief of the authors that the rural people of the United States are rapidly learning that health security is attainable and are rising up against inertia and inaction.

It is to be hoped that those who desire to learn more about the inequalities of health services in this nation, as well as the steps that the authors feel should be taken to overcome the deficiencies, will read this most important book.—*R. M. Walls.*

140 Million Patients. By Carl Malmberg. 235 pages with illustrations and tables. Index. Price $2.75. New York: Reynal and Hitchcock, Inc., 1947.

The author's object appears to be to show that the American public is sick and needs medical care, to show that existing medical care is not all of high quality and to advocate some program of medical care for everyone. The six chapters are entitled: health inventory —U.S.A., the cost of sickness, how good is American medical care?, prescription for better health, voluntary plans—too little and too late and 140 million patients can't be wrong.

Some of the author's charts to prove that Americans are not the healthiest in the world inadvertently imply, by their construction, that the United States is at the bottom of the list in some health conditions. Also, he refers to many atypical cases in describing inequalities of health conditions in such a way that some casual readers may receive a distorted view of the nation's health problems by interpreting these as the modes or averages.

Mr. Malmberg believes that much more medical service could be provided by the same outlay of money that is now being spent on medical care, if it were "put to really efficient use. . . ." For example, he favors physician partnerships wherein overhead costs and the necessity of each owning expensive specialized equipment might be reduced.

He discusses "fee-splitting," "kick-backs," "commissions," "prescription padding" and the cost of medicines. He documents his book with many references from the *Journal of the American Medical Association* revealing inaccuracies in some diagnoses and imperfections in medical care that have been recorded.

The author gives little or no attention to dentistry. He devotes a sentence or two to the distribution of dentists and also gives an estimate as to the cost probably required to provide the nation with adequate dental care. He suggests that while any program for complete dental care for all is probably impractical, it would be well to spend more money now on the dental care of children and for research on the cause of dental disease.

Arguments that have been advanced both for and against compulsory health insurance plans and voluntary plans are discussed at some length. The author records some congressional testimony and other published reports with a view to showing that some adequate health insurance program is needed for both those who can afford it and those who cannot.

The author views with alarm any program in which there is a possibility for organized medicine to have a representative in the top administrative pattern. He is very dissatisfied with the Taft bill but believes that the Wagner-Murray-Dingell bill, in spite of some drawbacks, would give "Americans much better health care than they have ever had."—*Shailer Peterson.*

Drug Research and Development. By Austin E. Smith, M.D. and Arthur D. Herrick. 596 pages. Index. Price $10. New York: Revere Publishing Company, 1948.

Drug Research and Development consists of 21 chapters written by 18 carefully selected and capable authors, nine from the pharmaceutical industry, three from universities, two from the American Medical Association and four who are associated with other private enterprises. The editors are a physician and an attorney.

Drug research and development, clinical testing, packaging and storage, labels and labeling, trade marks and patents, drug laws and regulations, advertising, detailing, retail price maintenance and council and professional acceptance are adequately discussed. Little attention is given to the specific field of dental product research and development or to A.D.A. standards.

The book is well-written, comprehensive and generally authoritative. The extensive practical information which it contains should be interesting and useful to those who are engaged in the development and marketing of pharmaceutical products.

CASES AND COMMENTS

Removal of a Cyst from the Mandible: Report of a Case. By R. O. Christensen, D.D.S., Oral Surgery Division, School of Dentistry, University of Minnesota, Minneapolis.

A well developed white man, aged 30 years, was referred to me by his dentist on April 6, 1946. During routine intraoral roentgenographic examination by his dentist, what appeared to be a cystic space had been disclosed in the region of the lower left second and third molars. An extraoral roentgenogram of the left mandible revealed a large cyst that occupied almost the entire body of the mandible and embraced the crown of an impacted third molar (illustration, left). The results of a physical examination were essentially negative.

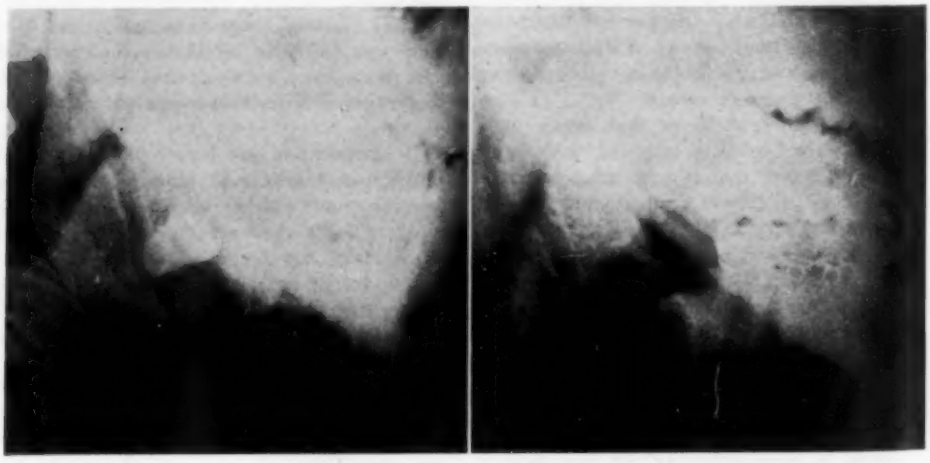
On April 14, 1946, the patient was admitted to the Fairview Hospital and an operation was performed on April 15. Premedication consisted of sodium propylmethylcarbinylallylbarbiturate ("Seconal Sodium"), 3 grains; an opium preparation, "Pantopon," ⅓ grain; and hyoscine hydrobromide, 1/200 grain. The anesthesia was cyclopropane administered by the endotracheal route.

Intramaxillary facial wiring was used on the maxilla and the mandible to preclude a fracture of the jaw during the operation. An incision was made along the crest of the lower left alveolar ridge, distal to the second molar, and this was reflected, exposing fairly dense bone.

The second molar was extracted, and the bone distal to it was removed, revealing a large cyst below this region. The cyst was enucleated in its entirety and the impacted third molar extracted. The incised region was closed with interrupted 00 silk sutures. The socket of the second molar and the cystic region were packed with iodoform gauze.

Examination on the day after the operation showed some swelling, pain and trismus. The postoperative course, however, was uneventful, and on April 18 the patient was discharged from the hospital.

The granulating area was packed with iodoform gauze every four days for a period of a month and a half, at which time granulations had filled in well. The patient was instructed to keep the area clean. On November 15 he was seen again in the office, and almost complete regeneration of the entire region was evident (illustration, right).



Left: Large cyst on the mandible in the left second and third molar region. Right: Almost complete regeneration of the mandible seven months after operation

Use of Radio Programs and Phonograph Recordings Transmitted Through Earphones to Divert Children in a Dental Practice.

By Alvin F. Gardner, D.D.S., Miami, Fla.

Fear and apprehension, induced in the child patient by previous experiences in the dental operating room, sight of the dental instruments and, more important, harrowing tales of relatives and friends, are tremendous handicaps to every practitioner of dentistry.

In my practice of orthodontics and pedodontics I have been able to use to great advantage radio programs and phonograph recordings by bringing them directly to the patient's ears while he is sitting in the dental chair.

I have a sanitary plastic headset weighing 1.2 ounces, which fits into the child's ears and hangs down under the chin (Fig. 1). It is a high fidelity crystal headset supplying perfect filtered reception. There is a small double twisted cord which runs from the patient's headset to a connection or socket attached to the adapter of the dental light. A hook is provided on the dental unit on which the headset is hung when not in use.

The headset is attached to a modern superheterodyne radio receiver. This receiver is provided with a switch at the rear of the set which can be used to send reception to the headset of the patient only or to the headset and loudspeaker simultaneously. This is desirable, since at times reception in all the rooms of the office is not wanted. Programs are easily changed by pressing push buttons.

Another line from the headset is attached to a phonograph, and recordings, such as children's stories or songs, can be heard by the child in the dental chair.

Fig. 1.—Headset in place

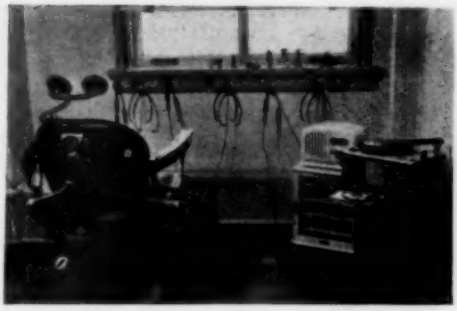


Fig. 2.—Extra earphones attached to radio and phonograph in an auxiliary room

Injections can be given, cavities prepared, restorations placed, orthodontic appliances constructed, cemented, and adjusted, and extractions can be accomplished while the child is preoccupied with the new device. The sound of the programs helps to eliminate the objectionable noise of the vibration of the bur, stone or diamond point. The child can also hear every word said to him with the headset in place.

If it is necessary to have a child wait for an anesthetic or premedication to take effect, or for cement or alloy to harden, he can be diverted by placing him or several children in an auxiliary room with a series of headsets attached to the same radio (Fig. 2).

The use of the radio and phonograph with earphones in the dental office cuts down the patient's desire to ask questions, or expectorate so often. It helps to remove fear and apprehension, and the child is diverted from the dentist's work. Time passes rapidly, and instead of dreading the next appointment he will look forward to its arrival.—*908-9 Congress Building.*

Obturator for Infant with Cleft Palate.

By James R. Seifert, D.D.S., Dental Intern, University of Minnesota Hospital, Minneapolis.

A 5 month old baby girl, with a complete cleft palate, was referred to the hospital dental service by the Department of Pediatrics of the University of Minnesota, with a request that an obturator be constructed to aid the

mother in feeding the child until the cleft could be closed surgically.

Because of the absence of the palate the baby required gavage feeding, which technic the mother had mastered. However, the tube was quite irritating and as a result the child coughed, choked and vomited through the nose during and after feeding.

Oral examination revealed a cleft palate extending from the region of the nasal palatine foramen posteriorally through the soft palate. Nasal structures were visible through the cleft. The lips were normal and no teeth were present (see illustration, above). There was no history of congenital anomalies in either family and the parents were not related.

A physical examination revealed a well nourished, white, 5 month old baby with a number of obvious congenital abnormalities. There was a hypogenesis of the auricles and external auditory meatus. The anterior fontanel was open. The ears were represented by skin tags. There was no external meatus. The mandible was very small. Extremities appeared normal. The nose revealed a constant mucoid discharge. Laboratory findings were negative.

The procedure for constructing the obturator consisted of taking a hydrocolloid impression under general anesthesia of thiopental sodium. The palatal portion of the obturator was constructed of fully cured acrylic. Along the periphery and in the cleft, soft acrylic was fused to the set palatal portion. This permitted flexibility for the insertion and withdrawal of the obturator, and produced peripheral retention. The palatal portion was polished down to a thickness of 1 mm. to allow for tongue movement (see illustration, below).

The mother was instructed to keep the appliance in place only during feeding and to cease gavage feeding. During the first week the child lost ¾ pound which was completely recovered during the second week. As the habit was acquired the child gained weight normally, and now reports to the clinic at three month intervals for the purpose of relieving the obturator as deciduous dentition progresses. The plastic periphery is permitting lateral growth of the maxilla. Operation on the palate will be done when the child is eighteen months old.—*412½ First Street North, New Ulm, Minn.*

Above: Cleft palate extending from the region of the nasal palatine foramen posteriorally through the soft palate. Note the normal lips.
Below: The completed obturator

Open Reduction of Comminuted Fracture of Ramus of the Mandible: Report of a Case. By R. O. Christensen, D.D.S., Oral Surgery Division, School of Dentistry, University of Minnesota, Minneapolis.

A 28 year old white soldier was admitted to the 100th Evacuation Hospital on March 28, 1945, as a battle casualty, approximately four hours after his wound occurred (Fig. 1, left). He was given 500 cc. of plasma on admission, and 20,000 units of penicillin were administered every four hours. Clinical and extraoral roentgenographic examination revealed a severe incised wound on the left side of the face, extending from the commissure of the mouth to the posterior portion of the neck, severing the masseter muscle and the anterior portion of the sternocleidomastoid muscle, and exposing the ramus of the mandible. There was a comminuted compound fracture of the ramus of the left mandible

Fig. 1.—Left: Wound on left face. Center: Wound after primary débridement. Right: Result of plastic closure of wound in layers

(a stellate type fracture with four punched-in fractures in the ramus) and a comminuted compound fracture of the left maxilla.

Under nitrous oxide-oxygen and ether anesthesia administered by the endotracheal route, meticulous débridement of all subcutaneous tissue was done (Fig. 1, center). The fracture of the ramus was reduced by wiring the fragments of the ramus in the correct position with 26 gage stainless steel wire inserted through holes drilled in the fragments (Fig. 2). After antrum débridement, the lateral wall of the maxilla was approximated in a normal position and the overlying tissues closed. All the muscles and subcutaneous tissues were approximated with 00 chromic sutures, and the skin was closed with 00 interrupted silk sutures (Fig. 1, right). A fenestrated Penrose drain was inserted over the fracture line and protruded through the posterior portion of the wound. Vaseline gauze and a pressure dressing were applied.

On March 30, Ivy-loop intermaxillary wiring was applied for additional support and immobilization of the jaw, and the Penrose drain was removed.

On April 1, the dressing was changed. The wound was healing nicely by primary intention, and the patient was evacuated by air to a plastic center in the United Kingdom.

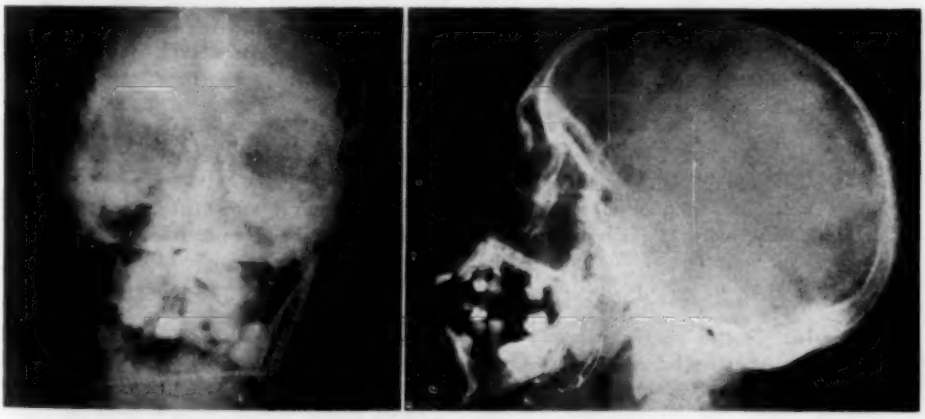


Fig. 2.—Extraoral roentgenograms revealing reduction of compound comminuted fracture of left ramus by direct wiring of bone fragments

CURRENT LITERATURE

Teeth and Skin Diseases. G. C. Andrews, A. N. Domonkos and M. E. Hopper. New York State J. Med. 48:2029, Sept. 15, 1948.

The authors report that from infancy to old age the teeth have a role in skin diseases. Even the old man with full upper and lower dentures may have eczema from a retained root fragment about which there is infection, or from pressure necrosis of the gingivobuccal mucosa caused by the dentures. Skin diseases on which dental conditions may have an effect are, chronologically:

1. Infantile eczema produced or exaggerated by deciduous teeth.

2. Alopecia areata in children 5 years of age or more, from teething or impactions.

3. Pustular rosacea, sycosis vulgaris, pustular bacterid, eczema, dental fistula or recurrent furunculosis from abscessed teeth, mostly in middle-aged persons.

4. Eczema of the legs, spreading to other parts of the body, caused by abscessed teeth in elderly persons.

5. Miscellaneous dermatoses, such as chronic urticaria, lupus erythematosus, erythema multiforme, erythema nodosum, purpura, pemphigus and so forth, in which focal infection may be a factor.

Case reports are cited, and discussion of the article by several other physicians follows. —*James Springer.*

Influence of Fluorine in Mottled Teeth on Dental Caries. Virgil D. Cheyne. Proc. Soc. Exper. Biol. & Med. 67:149, February 1948.

By total salivary gland extirpation, the influence of saliva was removed in rats subjected during prenatal life to fluorine in amounts sufficient to cause mottling. It was then possible to test the influence of fluorinized teeth acting alone against caries-producing conditions.

Observations in this study after 104 days of feeding a caries-producing diet were: Group 1—Normal animals had an average of 4.0 carious cuspal involvements and 1.8 carious teeth. Group 2—Animals with salivary glands extirpated averaged 36.6 carious cuspal involvements and 10.6 carious teeth. Group 3—Animals with mottled molars averaged 5.4 carious cuspal involvements and 1.5 carious teeth. Group 4—Desalivated rats with mottled molars averaged 28.1 carious cuspal involvements and 8.5 carious teeth.

In all animals examined, the number of cavities in the lower teeth exceeded those in the upper. Because the average number of carious teeth in group 3 was only slightly lower than in group 1, it seems that the fluorine incorporated in the tooth substance had little, if any, influence in retarding caries. The greater number of carious cuspal involvements in group 3 supported this assumption.

Although desalivated rats with mottled or fluorinized teeth had lower caries scores than desalivated nonfluorinized rats, the data furnished evidence that the saliva offers greater protection against caries than the fluorine in the tooth substance.—*James Springer.*

Oral Reactions to Penicillin. W. G. Cross. Brit. M. J. 1:171, January 29, 1949.

Reaction to penicillin applied within the mouth may take the form of tongue discoloration or stomatitis. Discoloration of the tongue occurs in 30 per cent of those who use the antibiotic orally. It begins two to four days after initiation of treatment and disappears in five to fourteen days. Painless pigmentation proximating the central furrow ranges from yellowish brown to black.

Stomatitis may appear on the third to fifth day of treatment. There is soreness of the tongue, mouth and pharynx which lasts six to ten days.

The addition of nicotinamide to a penicillin lozenge does not prevent these reactions. The use of the lozenge base alone does not produce the effects. Reactions do not appear until there has been a change in the oral flora, which takes about 48 hours, and topical oral use of penicillin should be limited to this length of time. To maintain an adequate continuous concentration, 10,000 units in chewing gum thrice daily is suggested.—*S. Leonard Rosenthal.*

Journal of Oral Surgery
October 1948

Titles marked with an asterisk are reviewed below by H. L. Hubinger.

*Recognition of Precancerous Lesions of the Oral Cavity. Edward E. Lyman, Pasadena, Calif.—277.

*The Blood and Oral Surgery. Herbert J. Bloom, Ann Arbor, Mich.—287.

*Roentgenographic Study of the Mandibular Joint. A. A. Sulke, Jerusalem.—299.

*Schüller-Christian's Disease With Reports of Cases. Dyer B. Talley, Syracuse, N. Y.—303.

*Fractures of the Mandibular Symphysis With Reports of Cases. Mack B. Delk and Gordon S. Letterman, St. Louis.—316.

*Central Giant Cell Tumors of the Jaws. Sol Bernick, Los Angeles.—324.

*Tantalum in Cranioplasty and Oral Surgery: Fabrication Technic and Report of Case. Charles J. Schork, Anthony K. Kaires and Frank B. Clare, St. Albans, L. I., N. Y.—331.

*Congenital Bilateral Hemangio-Endothelioma: Clinicopathologic Report. Malcolm Wallace Carr, New York.—341.

Mandibular Asymmetry Following Osteomyelitis: Report of Case. Joseph E. Schaefer, Chicago.—351.

*Perimandibular Ossification of Possible Traumatic Origin: Report of Case. Adolph Berger, New York.—353.

Complete Coronal Resorption of a Tooth in a Dentigerous Cyst: Report of Case. James M. Helzberg, Kansas City, Mo.—357.

Recognition of Precancerous Lesions of the Oral Cavity. Edward E. Lyman.

Precancerous lesions are all those which present no microscopic or other evidence that they will eventually become malignant but which are considered to predispose to carcinoma because a larger percentage of cancer develops at the sites of the lesions than in corresponding healthy tissue.

Three general classifications of precancerous lesions are: (1) malignant degeneration of benign tumors of long standing; (2) mechanical and chemical irritation and certain conditions of dental and oral cleanliness, and (3) a number of physiologic changes within the oral mucosa.

Leukoplakia, a hyperplastic lesion, is considered under the third classification. This disease is by no means restricted to the oral regions, but is also encountered in the vagina, the bladder and other mucous membranes of the body. If this fact is taken into consideration it may be seen that an inherent tendency to hyperkeratosis may exist, which manifests itself subsequent to local irritation.

The Blood and Oral Surgery. Herbert J. Bloom.

The diagnostic signs of the common anemias are presented. In pernicious anemia the tongue may be hypersensitive, beefy red and smooth. This glossitis is found also in the hypochromic anemias, gastric neoplasms, cirrhosis of the liver and intestinal obstructions. It is a common finding in the deficiency anemias. Experimental data have indicated that the deficiency is produced by the failure of some functions of the stomach. The substance whose deficiency is responsible for the tongue changes probably is part of the vitamin B complex. Tongue symptoms are unusual in any of the anemias except the deficiency group.

Except for emergency operations, no surgery should be undertaken on patients presenting a hemoglobin level below 60 per cent or an erythrocyte count below 3,500,000 per cubic millimeter. With patients who have polycythemia vera, surgical measures may result in postoperative hemorrhage that is very difficult to control.

Agranulocytosis may be caused by the ingestion of drugs such as aminopyrine, sulfonamide derivatives and benzol compounds. One of the earliest signs of the disease is the necrotic ulcer often found in the mouth.

Purpura, hemophilia, prothrombin deficiencies and scurvy are also discussed.

Roentgenographic Study of the Mandibular Joint. A. A. Sulke.

Sulke describes various technics for showing condyles in roentgenograms. When desiring to show both condyles in the conventional anterior-posterior view, the author prefers the anteroposterior to the posteroanterior projection, because in the former position the condyle region is nearer the film. The occiput is laid on the plate, and the tube is vertical above the nose.

Schüller-Christian's Disease With Reports of Cases. Dyer B. Talley.

The author favors the theory that Schüller-

Christian disease is a disturbance of lipoid metabolism, rather than the theory that the lesions are of infectious origin. As a descriptive name for the disease he suggests "osseous eosinophilic lipogranuloma."

One of the first symptoms of the disease is soreness, not pain, of the soft tissue and bone over the lesion without any clinical evidence of inflammation. The overlying gum tissue appears normal in spite of extensive rarefied areas of the maxilla or mandible. The bone defects within the jaws appear to be confined to the cancellated bone structure, so there should be little fear of pathologic fracture or penetration of the antrum or nose. There is no bulging of the bones. Patients are likely to have symptoms of exophthalmos and diabetes insipidus.

Careful biopsy of numerous sections is necessary because too often fibrous and inflammatory tissues may hide the true picture. In addition to granulation and necrotic tissue, fibroblastic and osteoblastic tissue and phagocytic giant cells, the sections should show histiocytes, eosinophilic infiltrations and fat laden monocytes.

Various forms of treatment have been tried without success, and surgical intervention is of no avail. Roentgenotherapy is the most positive form of treatment and will check the progress, at least for a time, of the destructive lesions of Schüller-Christian disease.

Fractures of the Mandibular Symphysis With Reports of Cases. Mack B. Delk and Gordon S. Letterman.

The authors recommend the use of skeletal wire fixation with a Kirschner type pin and an arch bar of the Risdon variety for reduction of fractures at the symphysis of the mandible. A stainless steel Kirschner wire (gage .035 to .045) is inserted in the bone by means of an ordinary motor driven bone drill. The pin is placed through and across the fracture line.

After the pin or pins have been placed across the fracture line, the Risdon type bar is applied to the lower teeth. A piece of stainless steel wire, 14 inches long, is placed around each of the second molars, with equal lengths projecting from the corners of the mouth. Each wire is twisted on itself until it is tight on the teeth. Then each wire is carried forward to the midline. Here they are twisted tightly together. The arch bar is then anchored to other teeth by individual wires.

Central Giant Cell Tumors of the Jaws. Sol Bernick.

Bernick reviews the literature and reports on the incidence, site of occurrence and other data relating to the central giant cell tumor of the mandible and maxilla. He believes the central tumor to be identical with that of long bones, but to be a different entity from the peripheral giant cell tumor, the so-called epulis.

Tantalum in Cranioplasty and Oral Surgery: Fabrication Technic and Report of Case. Charles J. Schork, Anthony K. Kaires and Frank B. Clare.

The authors outline a technic for the restoration of a bony defect of the skull by use of a tantalum plate. They recommend the use of this inert metal as a valuable adjunct for the restoration of bony defects encountered in maxillofacial and oral surgery.

Congenital Bilateral Hemangio-Endothelioma: Clinicopathologic Report. Malcolm Wallace Carr.

Carr presents an interesting case of hemangio-endothelioma in an infant girl under observation from the age of 7 weeks until death eight weeks later. The principal lesion was in the face and neck, and at necropsy a similar lesion was found in the colon. The tumor in the facial region destroyed practically all the salivary glands. Also found at necropsy was a small neuroblastoma of the suprarenal gland.

Perimandibular Ossification of Possible Traumatic Origin: Report of Case. Adolph Berger.

Berger reports the case of a girl, aged 12 years, who had an extensive ossified tumor, as shown by roentgenograms, located over and about the entire ascending ramus of the mandible. Three months previously a mandibular first molar had been removed on the same side, and there was a history of swelling and low grade infection following the extraction.

The tentative diagnosis was fibrous osteoma or ossifying hematoma. A section of the tissue 3 cm. in diameter was removed for biopsy,

which revealed an ossified structure with evidence of low grade infection.

Three months after the biopsy the tumor completely resolved. The tumor was thought to be subperiosteal. Its origin and peculiar disappearance are baffling.

Journal of Dental Research

December 1948

Titles marked with an asterisk are reviewed below.

The Editor's Viewpoint.—647.

*Dental Engineering. E. S. Smyd, Detroit.—649.

*The Incisive Papilla: The Basis of a Technic to Reproduce the Positions of Key Teeth in Prosthodontia. Robert N. Harper, Danville, Va.—661.

*Experimental Studies in Calcification. VI. Response of Dentin of the Rat Incisor to Injections of Strontium. J. T. Irving and J. P. Weinmann, University of Illinois and Loyola University (Chicago).—669.

*Glycogen and Carbohydrate-Protein Complex in Developing Teeth of the Rat. Milton B. Engel, University of Illinois.—681.

*A Comparison of Two Methods of Ashing Enamel and Dentin. Mary Jane Bird, Harriet Gallup, Jacob Gaudino and Harold C. Hodge, University of Rochester.—693.

*An Electronic Strain Gauge for Measuring Oral Forces. A. H. Howell and R. S. Manly, Tufts College.—705.

International Association for Dental Research. Scientific Proceedings of the New York Section.—713.

Scientific Proceedings of the Philadelphia Section.—716.

Proceedings of Twenty-Sixth General Meeting, Rochester, N. Y., June 18, 19, and 20, 1948. Compiled by Hamilton B. G. Robinson, Ohio State University.—717.

Dental Engineering. E. S. Smyd.

Structural cements and undoubtedly dental cements are relatively weak in resistance to tension and shear. The deficiencies of the dental bond in these respects must be compensated for by the mechanics of cavity preparation. In consideration of the magnitude of the biting forces brought to bear on dental bridges, the torsion and bending of the pontic or "beam" must be very significant. By experiment it is proved that this bending varies directly as the cube of the length of the bridge span, and inversely as the cube of the depth.

To offset the deleterious effects of torsion and bending on the dental bond, the coupling between the abutment castings and the abutment teeth should be such as to subject the cement to compressive stress. Though cavity preparation for abutment castings must employ draft, "critical" pitch must not be exceeded or mechanical coupling is sacrificed. The characteristics of bridges and abutments may be studied in cardboard and wooden models, and on the basis of these studies intellectual rather than empiric solutions may be found to prosthetic structural demands.

The Incisive Papilla: The Basis of a Technic to Reproduce the Positions of Key Teeth in Prosthodontia. Robert N. Harper.

The correct arrangement of the anterior teeth as well as the location of the occlusal plane has always been a problem in complete prosthodontics. This problem can be solved by using the median raphe as the stable base with its incisive papilla as the reference point, together with a "denture gage," the function of which is based on a system of parallel and perpendicular measurements performed on a maxillary pre-extraction record model. These measurements are subsequently transferred to the edentulous model.

Accurate transfer measurements can also be made from an immediate full or partial upper denture.

The gage includes a horizontal arm to which is attached an adjustable vertical arm with an incisal table for measuring the position of the anterior teeth. Depending from the horizontal arm in fixed position thereon is a papilla pin for orienting the gage to the reference point on the model.

Adapted for vertical and horizontal adjustments and at right angles to the horizontal arm is the palatal pin, the foot of which is so designed that a surface can be located which is approximate to the median raphe in the posterior region and the plane of which is parallel to the surface of the incisal papilla.

The gage is also provided with occlusal plane arms with adjustable pins for the purpose of measuring the position of any point on the occlusal plane.

Experimental Studies in Calcification. VI. Response of Dentin of the Rat Incisor to Injections of Strontium. J. T. Irving and J. P. Weinmann.

The effect of single injections of strontium chloride on the dentin of the rat incisor has been studied histologically.

Strontium produced changes in the dentin of a definite pattern consisting of (1) a calciotraumatic line, (2) a hypocalcified layer and (3) a hypercalcified layer.

Measurements showed that the hypocalcified layer represented the pre-experimental predentin which had remained uncalcified. The hypercalcified layer was formed immediately after the injection. The border between hypo- and hypercalcified layers of dentin represented the demarcation between pre-experimental and experimental dentin and is called the experimental dentin line. Silver staining showed that the hypocalcified layer had a structure similar to that of old predentin and that the hypercalcified layer, which was intensively stained by hematoxylin, contained fewer fibrils than the normal dentin.

A single injection of strontium is an effective and accurate means of marking the dentinopulpal border at the beginning of different experimental procedures.

The analysis of the structure of the calciotraumatic layer was used to outline hypothetically the stages of dentinogenesis.

Glycogen and Carbohydrate-Protein Complex in Developing Teeth of the Rat. Milton B. Engel.

The localization of glycogen and of carbohydrate-protein complexes in developing teeth of the rat (0 to 16 days) was studied. Fixation was done by freezing and drying, and histochemical identification of carbohydrate-containing substances was made by the Hotchkiss periodic acid-fuchsin sulfite method.

Glycogen was found to occur in the malpighian layer of the oral epithelium, in the dental lamina and at varying times in the outer enamel epithelium, stellate reticulum and stratum intermedium. The ameloblasts, odontoblasts and pulp of the incisor contained glycogen in the early stages. It was found in the odontoblasts and pulp of the molar in a few instances. Glycoprotein material was observed in the cells of the outer enamel epithelium, stellate reticulum and stratum intermedium, in the processes of the connective tissue cells and in the cement substance between the ameloblasts.

Both dentin and enamel were shown to contain carbohydrate-protein complexes; the precursors of these substances were observed in the odontoblasts and ameloblasts, respectively, just prior to the formation of dentin and enamel. While the enamel cuticle precursor resisted acid solvents, the glycoprotein of the enamel matrix was soluble in the pH range 1 to 5. This was regarded as significant for the understanding of the pathogenesis of enamel caries.

A Comparison of Two Methods of Ashing Enamel and Dentin. Mary Jane Bird, Harriet Gallup, Jacob Gaudino and Harold C. Hodge.

About fifty teeth were separated into enamel and dentin. An aliquot of each tissue was then ashed by incineration (heat ash) and another by extraction with 3 per cent potassium hydroxide in ethylene glycol (glycol ash). Calcium, magnesium and phosphorus analyses were made on every ashed aliquot.

Incineration drives off carbon dioxide so that the heat ash always was a smaller percentage of the dry weight than was the glycol ash, which contained all of the carbon dioxide. The percentages of calcium, magnesium and phosphorus in the heat ash was therefore higher than in the glycol ash.

An Electronic Strain Gauge for Measuring Oral Forces. A. H. Howell and R. S. Manly.

An electronic strain gauge, devised for measuring oral forces, makes use of the principle of change in inductance of a coil as a silver plated spring is brought near it. The deflection of this spring is proportional to the force applied. The coil is part of a tuned circuit which is coupled to a radio-frequency oscillator. Force applied to the spring changes the inductance and tunes the coupled circuit away from the oscillator frequency. This permits the amplitude of oscillation to increase, and the magnitude of the grid current in the oscillator is used as a measurement of biting force.

Four sets of elements are employed to cover the ranges from 100 to 300 pounds, 30 to 100, 5 to 30, and 1 to 5 pounds.

The bite element is narrow enough to permit maximum force readings on any tooth in the mouth with a bite opening of 7 to 10 mm. The bite element is small, light, unaffected by temperature and moisture, and capable of withstanding sterilization.

LIST OF DENTAL OFFICERS

SEPARATED FROM NAVY DENTAL CORPS

THE following naval dental officers have been separated from service, according to lists received from the Navy Department. These lists are not complete. Other names will be published as soon as possible.

Alabama		
Opelika	Whatley, William B.	Lieut.
California		
Compton	Reece, Herman H.	Lieut.
Hollywood	Jensen, Stephen F.	Cmdr.
Los Angeles	Sparkuhl, Charles	Lieut.
Connecticut		
Thompsonville	Scavotto, P. J.	Capt.
District of Columbia		
Washington	Presley, J. M.	Capt.
Georgia		
St. Americus	Lee, P. W.	Lieut.
Illinois		
Chicago	Kulis, Renald J.	Lieut.
Indiana		
Valparaiso	LaCount, D. P.	Capt.
Kentucky		
Middlesboro	Adams, William H.	Lieut.
Russell	Porter, Ted. J.	Cmdr.
Louisiana		
New Orleans	Kirn, J. T., II	Capt.
Massachusetts		
Concord	Flavin, John F.	Lieut.
Methuen	Contarino, Angelo R.	Lieut.
Newton	Hughes, Wilbur R.	Lieut.
Worchester	Mullins, Henry J.	Lieut.
Minnesota		
Little Falls	Blair, Keith S. P.	Lieut.
Montana		
Helena	Livingston, Neil C.	Lieut.
Nebraska		
Omaha	Merchant, Eugene S.	Lieut.
New Jersey		
Lyndhurst	Kidder, William E.	Lieut.
Newark	Siegel, M.	Lieut.
New York		
Brooklyn	Antony, Michael	Lieut.
Brooklyn	Seidenberg, J. W.	Lieut.
Brooklyn	Spiegel, Martin	Lieut.
Brooklyn	Valenti, A.	Capt.
Far Rockaway	Vlahov, W. J.	Capt.
New York	Krautheimer, F.	Lieut.
Nyack	Weishaar, Robert B.	Lieut.
North Caroline		
Robbins	Hussey, T. E.	Capt.
Ohio		
Garfield Heights	Raus, Elmer E.	Lieut.
Rocky River	Otter, William H.	Lieut.
Oklahoma		
Henryetta	Carmichael, J. B.	Capt.
Oklahoma City	Wright, R. E.	Capt.
Virginia		
Portsmouth	Skeppstrom, T. E., Jr.	Lieut.
Richmond	Bunn, Donald F.	Lieut.
Richmond	Thurman, Walter L.	Lieut.
Washington		
Algoma	Hruska, Harvey J.	Lieut.
Clear Lake	Peterson, John A.	Lieut.
Ellensburg	Thompson, Kerwin E.	Lieut.
Kettle Falls	Hardwick, Robert W.	Lieut.
Longview	Donahue, Francis J.	Lieut.
Spokane	Gillingham, C. B.	Lieut.
Yakima	Crockett, William C.	Lieut.
West Virginia		
Athens	Lilly, Donzie, Jr.	Lieut.
Charleston	Dean, James G.	Lieut.
Charleston	Roth, Lester H.	Lieut.
Charleston	Simpson, Robert R.	Lieut.
Fairmont	Stalnaker, Bernard D.	Lieut.
Wisconsin		
Appleton	Fetting, Earl A.	Lieut.
DeForest	Bakke, Knight J.	Lieut.
Green Bay	Valentine, Gordon A.	Lieut.
Milwaukee	Copoulos, Paul C.	Lieut.
Milwaukee	Ebersperger, E. J.	Lieut.
Milwaukee	Goldman, Ralph B.	Lieut.
Milwaukee	Hannan, John E., Jr.	Lieut.
Milwaukee	Mandler, Walter J.	Lieut.
Oshkosh	Herman, Robert E.	Lieut.
Osseo	Carlson, Stanley	Lieut.
Stanley	Pirus, Allen L.	Lieut.
Waukesha	Doyle, John E.	Lieut.
Wauwatosa	Wehrley, Keith H.	Lieut.

DEATHS

Akin, M. M., Fairmont, Neb.; died January 1; aged 74.

Anderson, David P., Santa Rosa, Calif.; died January 4; aged 80.

Angles, Warner A., Reading, Pa.; died December 14; aged 90.

Beaumont, Francis H., Wichita, Kan.; died December 31; aged 76.

Binder, Hyman, Long Island, N. Y.; died in November; aged 46.

Caesar, Frank M., Leucadia, Calif.; Pennsylvania College of Dental Surgery, 1900; died January 26; aged 59.

Camp, Frederic H., Los Angeles; Pennsylvania College of Dental Surgery, 1902; died January 10; aged 74.

Carnes, W. C., Henryetta, Okla.; San Francisco Dental College, 1916; died January 7.

Cerniglia, John J., Milwaukee; Dental School, Marquette University, 1937; died January 13; aged 37.

Chandler, R. R., Wilkes-Barre, Pa.; School of Dentistry, University of Pennsylvania, 1913; died October 26.

Colby, Norman E., Fort Madison, Iowa; Keokuk Dental College, 1908; died January 24; aged 68.

Consaul, John A., Columbus, Ohio; College of Dentistry, Ohio Medical University, 1901; died December 31; aged 80.

Cook, Stanton W., Cleveland; died December 26; aged 69.

Courtright, Burton A., Wilkes-Barre, Pa.; School of Dentistry, University of Pennsylvania, 1903; died January 7; aged 67.

Cromwell, H. E., Port Allegheny, Pa.; School of Dentistry, University of Pittsburgh, 1903; died January 23; aged 72.

Cupit, George W., Philadelphia; Pennsylvania College of Dental Surgery, 1884; died January 2; aged 88.

Custer, Nathan, Dayton, Ohio; College of Dentistry, Ohio Medical University, 1897; died January 15; aged 75.

Daniels, Richard H., Peoria, Ill.; Chicago College of Dental Surgery, Dental Department, Loyola University, 1905; died January 14; aged 65.

Dillon, Arthur H., Philadelphia; School of Dentistry, University of Pennsylvania, 1917; died January 22; aged 63.

Dornberger, Edward L., San Diego, Calif.; School of Dentistry, College of Physicians and Surgeons of San Francisco, 1904; died January 6; aged 70.

Friderich, Julius M., Wallingford, Conn.; died January 22.

Frumveller, Edward, Detroit; Department of Oral Surgery, Detroit College of Medicine, 1897; died January 5; aged 76.

Fryer, Claude M., Camp Taylor, Ky.; School of Dentistry, University of Louisville, 1903; died January 28; aged 74.

Griffith, William A., Rio Piedras, Puerto Rico; School of Dentistry, University of Buffalo, 1902; died October 13.

Hardy, James H., New York; College of Dental and Oral Surgery, 1918; died January 15; aged 70.

Hendrick, L. C., Milbank, S. D.; Western Dental College, 1917; died January 10; aged 66.

Hillweg, Charles U., Chicago; Dental School, Northwestern University, 1910; died January 21; aged 64.

Hodge, Edward L., McPherson, Kan.; Kansas City Dental College, 1912; died January 28.

Hunter, Irvine, Colorado Springs, Colo.; Denver College of Dentistry, 1896; died January 8; aged 77.

King, Clifford L., Maynard, Mass.; Boston Dental College, 1899; died October 16; aged 73.

Kreit, Herman, Detroit; College of Dental Surgery, University of Michigan, 1893; died November 3; aged 82.

Le Beau, Henry C., Canton, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1892; died in January; aged 82.

Littig, Mark D., Boston; School of Dentistry, University of Pennsylvania, 1894; died January 15; aged 78.

Lyman, Sam W., Topeka, Kan.; Indiana Dental College, 1897; died January 15.

Margason, Nannie, Oakland, Calif.; died January 23; aged 92.

McCowen, Charles S., Palo Alto, Calif.; School of Dentistry, University of Pennsylvania, 1899; died December 20.

McKay, Grover C., Dayton, Ohio; died January 14; aged 64.

Mertz, Daniel G., Fort Wayne, Ind.; Indiana Dental College, 1915; died January 14; aged 57.

Meter, William, Reading, Pa.; Medico-Chirurgical College of Philadelphia, 1900; died January 21; aged 75.

Morton, Dean A., Niles, Mich.; College of Dental Surgery, University of Michigan, 1931; died December 11; aged 41.

Nairne, Alfred S., Boston; Meharry Dental College, Dental Department, Meharry Medical College, 1914; died December 29.

Nelson, Mark O., St. Paul; College of Dentistry, University of Minnesota, 1895; died January 7.

Norris, J. Frank, Philadelphia; died January 8; aged 78.

O'Hara, Matthew M., Chicago; died in January.

Oien, Gerhard O., Canby, Minnesota; Dental School, Marquette University, 1911; died January 22; aged 67.

O'Keefe, William E., Rochester, Minn.; Chicago College of Dental Surgery, Dental Department, Loyola University, 1902; died January 2; aged 70.

Owens, Claude D., Grand Rapids, Mich.; died December 21.

Paffenbarger, A. W., McArthur, Ohio; College of Dentistry, Ohio State University, 1924; died January 30; aged 92.

Parsons, Luther M., Baltimore; Baltimore College of Dental Surgery, 1893; died February 23; aged 75.

Pennington, Jesse A., Pittsburgh; School of Dentistry, University of Pittsburgh, 1902; died February 21; aged 71.

Philie, Henry J., North Adams, Mass.; Tufts College Dental School, 1922; died February 25; aged 49.

Phillipy, O. B., Anderson, Indiana; School of Dentistry, Indiana University, 1901; died February 18; aged 73.

Pittenger, William E., Hillsboro, Ore.; School of Dentistry, North Pacific College of Oregon, 1907; died January 15; aged 67.

Plumstead, Charles H., West Springfield, Mass.; School of Dentistry, University of Buffalo, 1897; died February 20; aged 73.

Pringle, George A., Seattle; died January 7; aged 80.

Puder, Russell D., Cleveland; College of Dentistry, Ohio State University, 1929; died in March.

Quackenbush, Harriet, Bellmore, New York; College of Dental and Oral Surgery, 1905; died February 22; aged 83.

Rayman, Stanley R., Cleveland; School of Dentistry, Western Reserve University, 1913; died January 27.

Read, E. C., Long Beach, Calif.; College of Dental Surgery, University of Michigan, 1911; died January 29; aged 71.

Reed, Albert A., Minneapolis; College of Dentistry, University of Minnesota, 1904; died February 15; aged 77.

Rice, Fred F., Tuscola, Ill.; Ohio College of Dental Surgery, University of Cincinnati, 1897; died January 12; aged 76.

Rogers, Neil O., Chicago; Dental School, Northwestern University, 1912; died March 8; aged 63.

Rudy, Leslie N., Los Angeles; Western Dental College, 1902; died February 19; aged 74.

Sackett, Harry N., Bolivar, New York; Philadelphia Dental College, 1898; died January 23.

Samuels, Robert J., New York; The New York College of Dentistry, 1914; died January 5.

Seavers, Frederick F., Portland, Ore.; died December 30; aged 78.

Seay, George E., Blackstone, Va.; died February 8; aged 73.

Shank, Elmer L., Davenport, Iowa; College of Dentistry, University of Iowa, 1939; died February 18.

Sharp, Joseph B., Bridgeton, N. J.; died March 15; aged 83.

Sharpe, Harry W., Putnam, Conn.; Tufts College Dental School, 1896; died February 28; aged 77.

Shaw, Frank I., Seattle; School of Dentistry, Vanderbilt University, 1898; died January 11; aged 70.

Shelton, William A., Jonesburg, Mo.; School of Dentistry, St. Louis University, 1905; died January 7; aged 73.

Sherman, William C., Indianapolis; Indiana Dental College, 1915; died February 27; aged 55.

Sherred, Roy W., Glendale, Calif.; College of Dentistry, University of Southern California, 1921; died November 6.

Slater, William K., Knoxville, Tenn.; School of Dentistry, Vanderbilt University, 1892; died January 24; aged 82.

Smith, Milton A., Monroeville, Ind.; Cincinnati College of Dental Surgery, 1899; died January 30; aged 80.

Soule, George W., Boston; Boston Dental College, 1896; died January 19; aged 78.

Stack, John G., Bronx, N. Y.; New York College of Dentistry, 1915; died February 9; aged 58.

Stamm, Charles P., Lancaster, Pa.; Philadelphia Dental College, 1891; died January 31.

Steele, E. M., Stephens City, Va.; School of Dentistry and the Baltimore College of Dental Surgery, University of Maryland, 1899; died January 14; aged 72.

Stinehart, J. E., Mason City, Iowa; College of Dentistry, University of Iowa, 1892; died February 4; aged 78.

Stone, Leander W., Morristown, Tenn.; died February 12; aged 81.

Sullivan, Gerald X., San Diego, Calif.; College of Dentistry, University of California, 1922; died January 6; aged 48.

Sundquist, William, Madison, Wis.; died February 22; aged 24.

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ANNOUNCEMENTS

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	May 2-4	Biloxi	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Arizona			H. G. DeWolf	Valley National Bank Bldg., Tucson
Arkansas			D. M. Hamm	White Bldg., Clarksville
California			L. E. Linehan	450 Sutter St., San Francisco
S. California			M. E. Ralston	Medico-Dental Bldg., Pomona
Colorado	May 25-27	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	June 1-3	New London	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			Norbert L. Gladnick	1009 Madison St., Wilmington
D. of Columbia			K. H. Wood	202-1835 Eye St., N.W., Washington
Florida	Nov. 10-12	Palm Beach	L. M. Schulstad	Professional Bldg., Bradenton
Georgia	Nov. 13-15	Savannah	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	June 15-18	Honolulu	J. H. Dawe	P. O. Box 39, Honolulu 10
Idaho	June 27-29	Idaho Falls	H. R. Packard	Idaho Falls
Illinois	May 9-12	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 16-18	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 2-4	Des Moines	H. I. Wilson	639 Insurance Exchange Des Moines
Kansas	May 22-25	Topeka	F. A. Richmond	1008 Huron Bldg., Kansas City
Kentucky			A. B. Coxwell	1976 Douglass Blvd., Louisville
Louisiana	June 1-4	New Orleans	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 23-25	Rockland	P. W. Anderson	32 Deering St., Portland 3
Maryland	May 2-4	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	May 2-5	Boston	P. E. Adams	106 Marlborough St., Boston
Michigan			F. Wertheimer	Michigan Department of Health, Lansing
Minnesota			C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi			F. C. Sneed	Osyka
Missouri			D. E. Hooper	K. P. Bldg., Boonville
Montana	May 5-7	Bozeman	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 9-11	Lincoln	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	June 3-4	Reno	L. G. Jacob	505 Chestnut St., Reno
New Hampshire	June 19-21	North Conway	F. E. Williams	814 Elm St., Manchester
New Jersey			J. G. Carr	407 Copper St., Camden
New Mexico	May 23-25	Albuquerque	J. S. Eilar	First National Bank Bldg., Albuquerque
New York	May 10-13	Buffalo	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 19-21	Pinehurst	R. F. Hunt	Rose Drug Co., Bldg., Rocky Mount
North Dakota	May 8-11	Bismarck	A. L. Smeby	Northwood
Ohio	Nov. 13-16	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma			E. H. Binkley	Hennessey
Oregon			C. Fixott, Jr.	Medical Dental Bldg., Portland
Panama Canal Zone			R. O. Leon	Box 1094, Ancon
Pennsylvania	June 1-3	Pittsburgh	J. Wittek	217 State St., Harrisburg
Puerto Rico			F. Guerra	Avenida Ponce de Leon, Santurce
Rhode Island			J. F. Colgan	838 Newport Ave., Pawtucket
South Carolina	May 1-3	Myrtle Beach	J. R. Owings	201 E. North St., Greenville
South Dakota	May 15-17	Aberdeen	E. W. Elmen	Sioux Falls
Tennessee	May 16-19	Knoxville	E. J. Justis	Exchange Bldg., Memphis
Texas	May 2-5	Houston	W. Ogle	313 Medical Arts Bldg., Dallas
Utah	June 9-11	Salt Lake City	H. R. Nordberg	807 Tribune-Telegram Bldg., Salt Lake City
Vermont	May 22-24	Woodstock	J. A. Larrow	Middlebury
Virginia			J. E. John	804 Medical Arts Bldg., Roanoke
Washington	June 20-22	Seattle	F. J. Dingler	1502 Medical-Dental Bldg., Seattle 1
West Virginia	May 19-21	Wheeling	C. J. Gavelda	Union Bank Bldg., Clarksburg

State	Date	Place	Secretary	Address
Wisconsin			R. A. Mason	964 N. 27th St., Milwaukee 2
Wyoming	June 27-29	Laramie	T. A. Ward	Casper

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 13-18*	Birmingham	M. W. Gaillard	Merchants Bank Bldg., Mobile
Arizona	July 6-9	Florence	R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 20-23	Little Rock	H. E. Hanna	Wilson Building, El Dorado
California	June 13	Los Angeles	K. I. Nesbitt	Room 307, 507 Polk Street,
	July 25	San Francisco		San Francisco 2
Colorado	June 20-24	Denver	E. G. Netherton	724 Republic Bldg., Denver 2
Connecticut	June 14-18*	Hartford	C. G. Brooks	302 State St., New London
Delaware	June 22-24	Wilmington	P. K. Musselman	Newark
Florida	July 11-16*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Illinois	June 21-24	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana	June 13-16	Indianapolis	C. A. French	Gary National Bank Bldg., Gary
Iowa	May 30-June 3	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	May 31-June 3	Kansas City	G. L. Teall	Hiawatha
Kentucky	June 20-23*	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana	May 30-June 3	New Orleans	A. R. deNux	Marksville
Maine	July 2-3	Augusta	R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 13-15	Baltimore	K. W. Preis	700 Cathedral St., Baltimore 1
Massachusetts	June 20-24‡	Boston	J. C. Wilson	413 N. State House, Boston
Michigan	May 23-28	Ann Arbor	J. L. Champagne	502 David Whitney Bldg., Detroit 26
Minnesota	June 13-18	Minneapolis	E. E. Comartin	334, 100 First Avenue Bldg., Rochester
Mississippi	June 21-23	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Nebraska	June 7-8†	Lincoln and	C. A. Bumstead	924 Stuart Bldg.,
	June 9-10	Omaha		Lincoln
New Jersey	June 6-10		W. A. Wilson	150 E. State St., Trenton
New Mexico	June 27-30	Santa Fe	J. J. Clark	Artesia
North Carolina	June 27-30	Raleigh	F. O. Alford	Charlotte
North Dakota	July 10-14*	Fargo	W. J. Ford	Fargo
Ohio	June 13-15†	Columbus	E. D. Lowry	79 E. State St., Columbus
	June 20-22†	Cleveland		
	June 27-29**	Columbus		
Oklahoma	June 13-15	Oklahoma City	N. D. Griffith	509 Medical Arts Bldg., Oklahoma City
Pennsylvania	June 20-25††	Philadelphia and Pittsburgh	R. E. V. Miller	Northampton, National Bank Bldg., Easton
Rhode Island	June 28-29	Providence	F. M. Hackett	State Office Bldg., Divn. Professional Regulation,
	Dec. 6-7			Providence
South Carolina	July 25	Columbia	E. G. Bumgardner	1517 Hampton St., Columbia 1
South Dakota	June 26-29	Sioux Falls	R. W. Ellis	Salem
Tennessee	June 6-10	Memphis	J. J. Vaughn	1005-6 Medical Arts Bldg., Nashville 3
Texas	June 19-24	Dallas	R. T. Weber	312 Capital National Bank Bldg., Austin
Vermont	June 27-29	Montpelier	F. A. Reid	Windsor
Virginia	June 14	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond
West Virginia	June 27-29	West Liberty	R. H. Davis	510-16 Goff Bldg., Clarksburg
Wisconsin	June 13-17	Milwaukee	S. F. Donovan	Tomah

*Dental and dental hygiene examination
†Practical examinations
**Theory examinations
††June 20-25 (dental); June 20-22 (dental hygiene).
‡June 20-24 (dental): June 22-24 (dental hygiene).

OTHER MEETINGS

Name	Date	City	Secy. or Chmn.	Address
Academy of Denture Prosthetics	June 13-18	Indianapolis	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
Akron Dental Society Twenty-Fourth Annual Clinic Meeting	May 11	Akron	H. E. Barlow Chm. Clinic Com.	414 Ohio Bldg., Akron 8
Alpha Omega Fraternity National Council	May 15	New York	Bernard E. Gruber Secy.	147 W. 42nd St., New York 18
American Academy of Dental Medicine, Annual Meeting	June 4-5	New York	W. M. Greenhut Secy.	124 E. 84th St., New York 28
American Association of Dental Examiners	Oct. 15-16	San Francisco	C. A. Bumstead Secy.	924 Stuart Bldg., Lincoln, Neb.
American Board of Orthodontics	May 1	New York	S. C. Hopkins Secy.	1726 Eye St., N.W., Washington 6, D.C.
American Dental Assistants Association	Oct. 17-20*	San Francisco	Mary L. Martin	610 Jefferson Ave., La Porte, Ind.
American Dental Association, Ninetieth Annual Meeting	Oct. 17-20	San Francisco	H. Hillenbrand Secy.	222 E. Superior St., Chicago 11
American Dental Hygienists' Association, Twenty-Sixth Annual Meeting	Oct. 17-21	San Francisco	A. Rebekah Fisk Secy.	1830 Eye St., N.W., Washington, D.C.
American Dental Society of Europe	Aug. 3-6	Paris	F. D. Derrick Secy.	140 Park Lane, London, W. 1
American Public Health Association, Seventy-Seventh Annual Meeting	Oct. 23	New York	R. M. Atwater Secy.	1790 Broadway New York 19
American Society of Oral Surgeons, Thirty-First Annual Meeting	Oct. 12-15	San Francisco	Harry Bear Secy.	1112 E. Clay St., Richmond 19
Canadian Dental Association, Annual Convention	June 6-8	Saskatoon	D. W. Gullett Secy.	211 Huron St., Toronto
Cleveland Dental Society, Annual Spring Clinic Meeting	May 2-4	Cleveland	H. S. Kudge Secy.	1220 Huron Road, Cleveland 15
Federacao Odontologica Brasileiro, Fourth Congresso	July	Recife, Brazil	R. Ewerton	277 Avenida Rio Branco, Rio de Janeiro
Greater Pittsburgh, Annual Meeting	June 1-3	Pittsburgh	W. Earle Craig Secy.	206 Jenkins Bldg., Pittsburgh 22
International Association for Dental Research, New York Section	May 5	New York	Isaac Neuwirth Secy.	209 E. 23rd St., New York 10
Mid-Atlantic States Seminar in Oral Medicine	May 22-27	Pocono Mountains	L. W. Burket Dir. Postgraduate Divn.	4001 Spruce St., Philadelphia
New England Dental Society, Annual Meeting	Oct. 5-6	Boston	A. R. Wilson Secy.	43 Farmington Ave., Hartford
Greater New York Dental Meeting, Twenty-Fifth Anniversary	Dec. 5-9	New York	H. S. Horton Chm. Press & Publication	Rm. 106A, Hotel Statler, New York 1
Ontario Dental Association, Eighty-Second Annual Convention	May 16-18	Toronto	Dorothy Jutton Secy.	86 Bloor St., West Toronto 5

*Examination for certification